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Physical & Applied Sci. Serials

The MINING WORLD and Engineering

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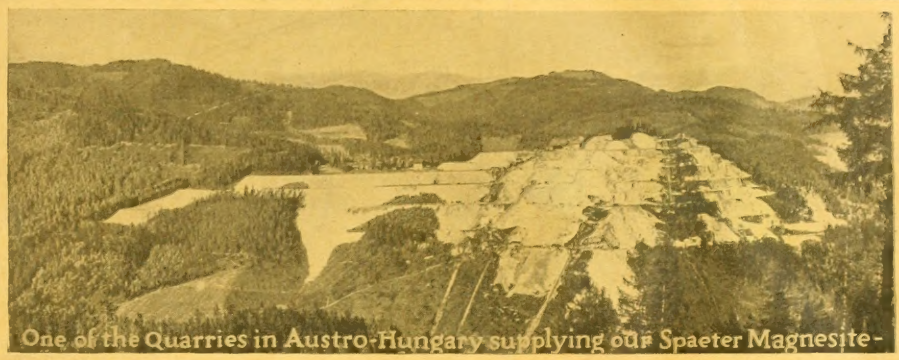

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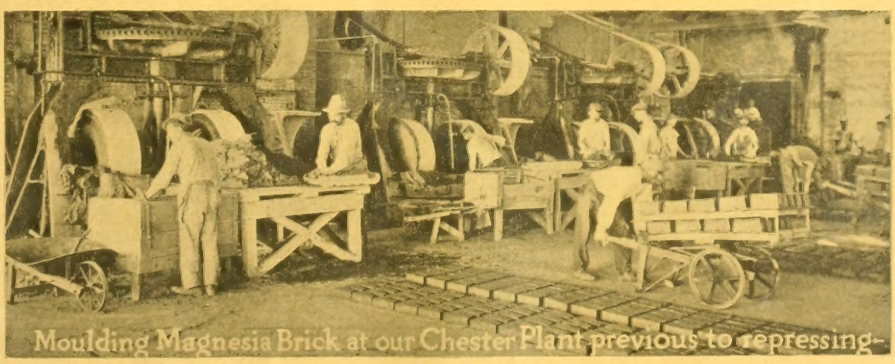

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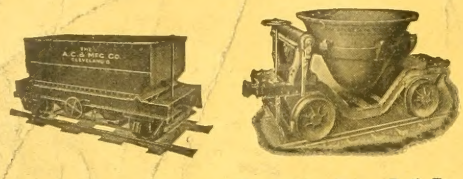

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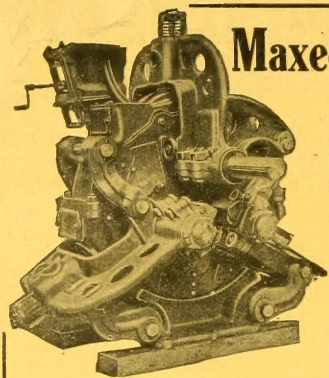

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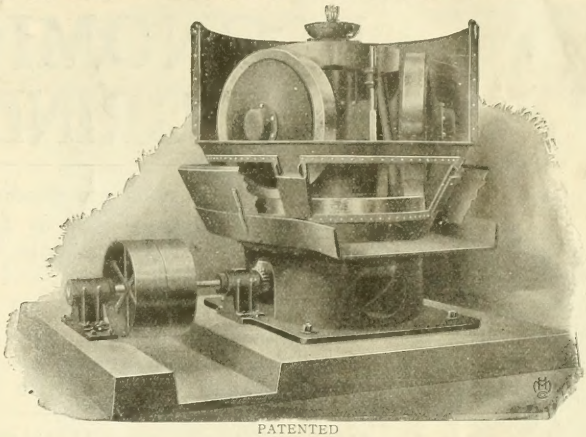

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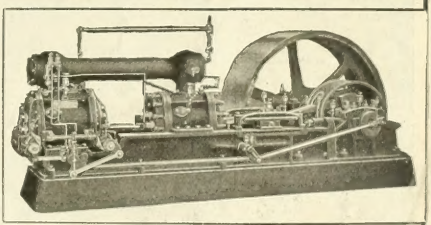

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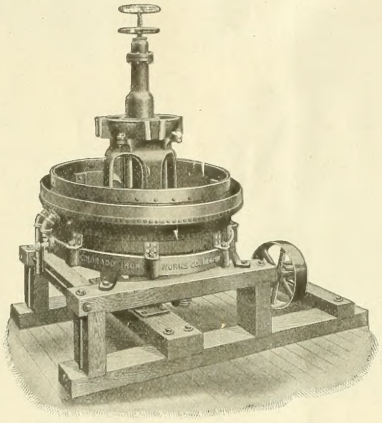

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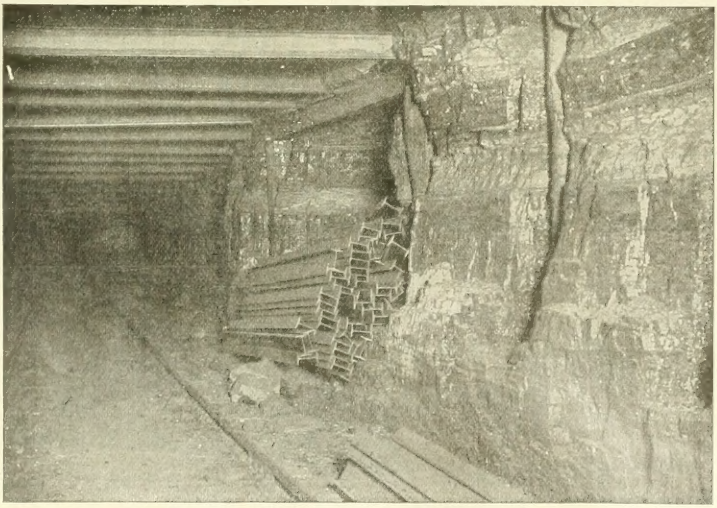

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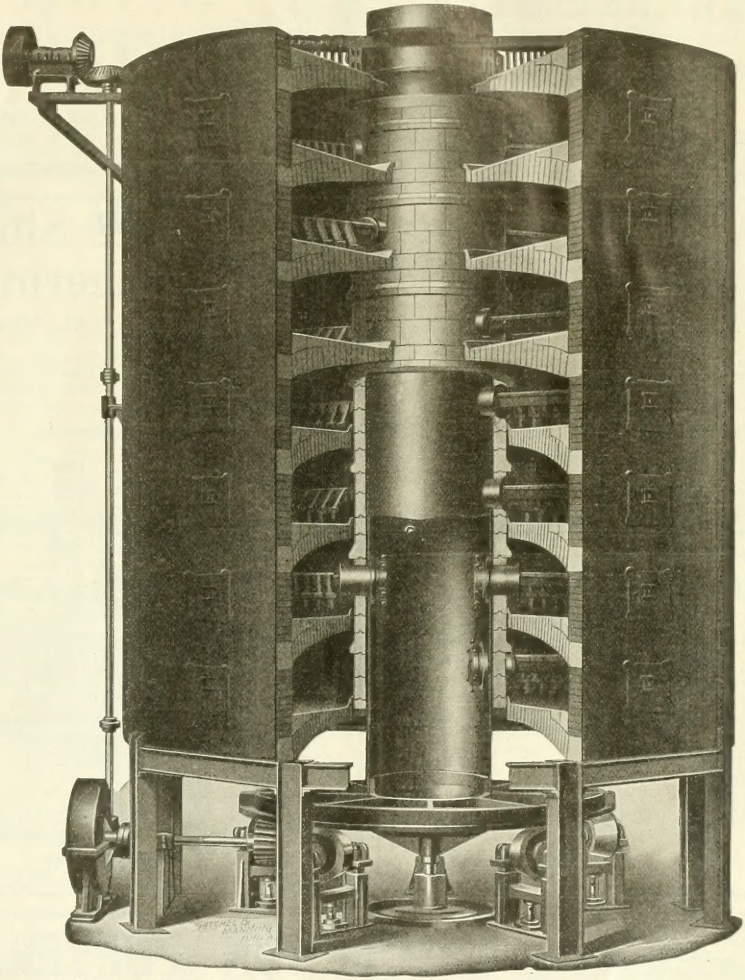

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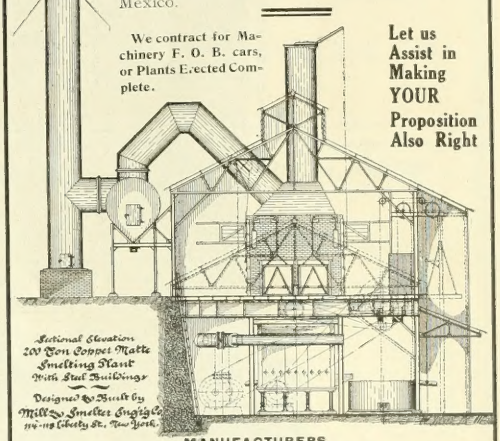

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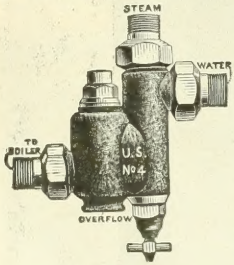

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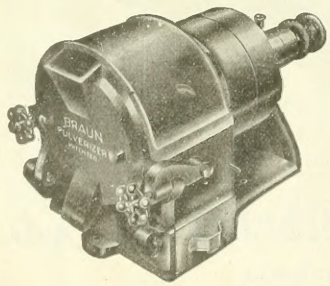

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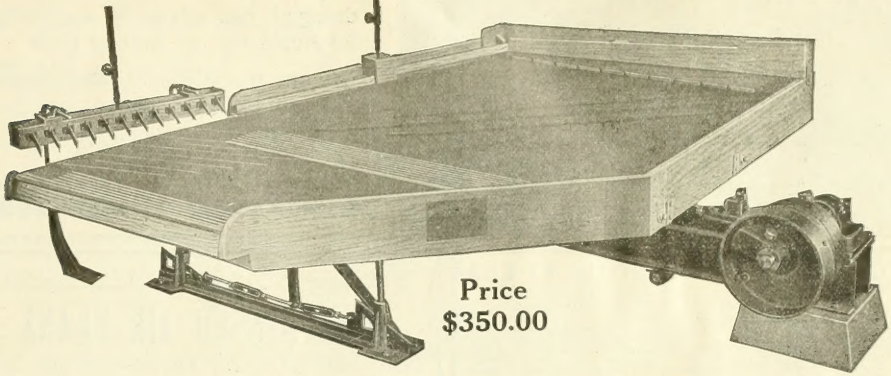

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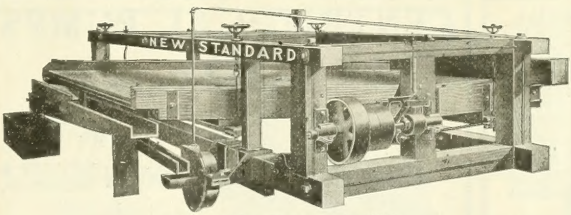

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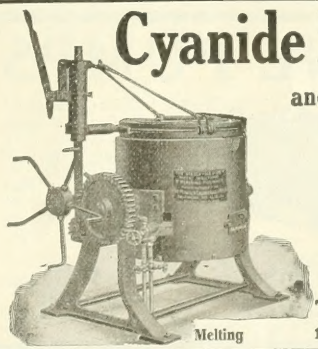

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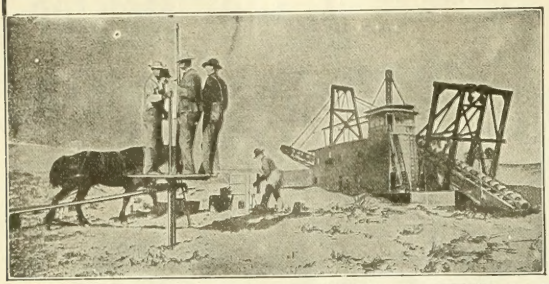

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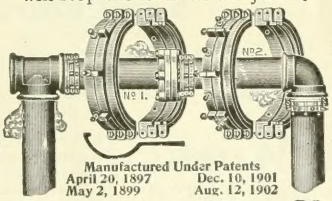

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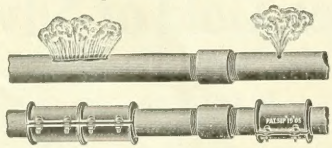

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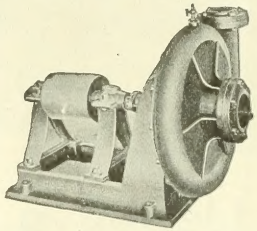

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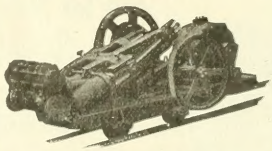

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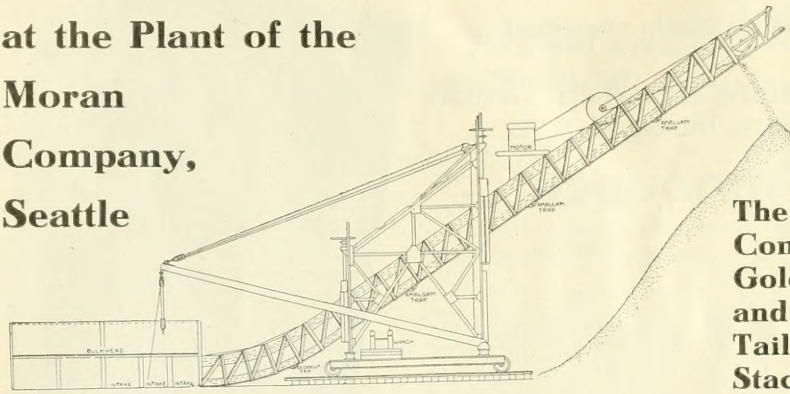

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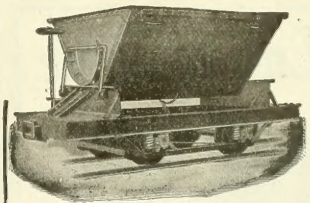

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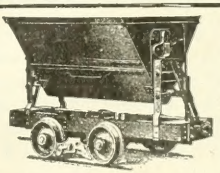

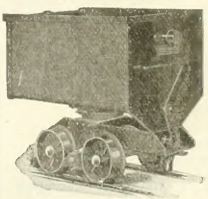

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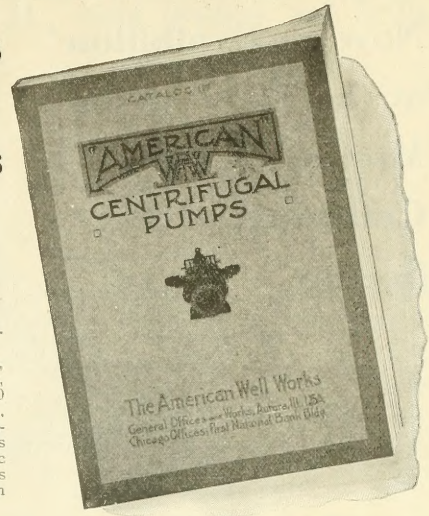

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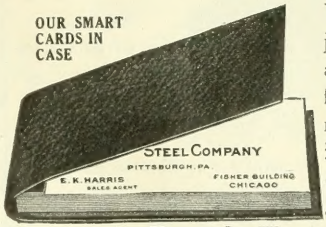

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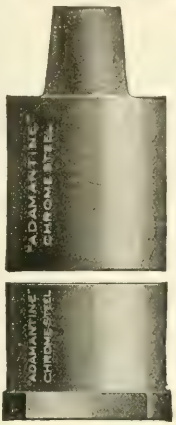

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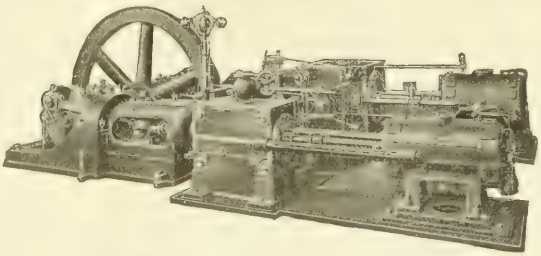

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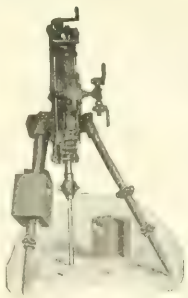

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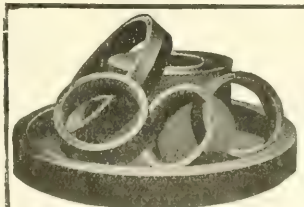

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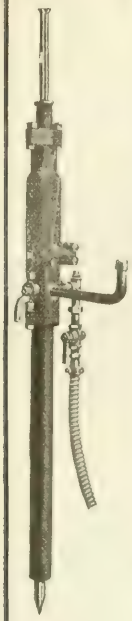

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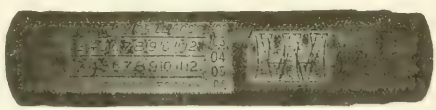

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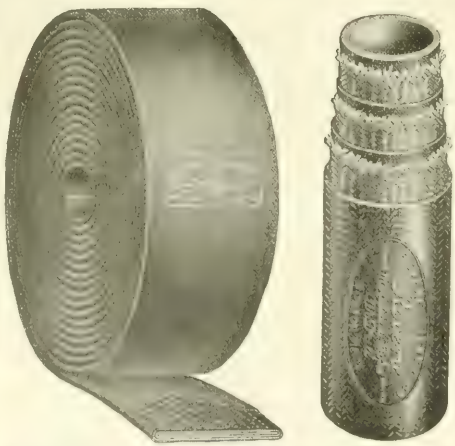

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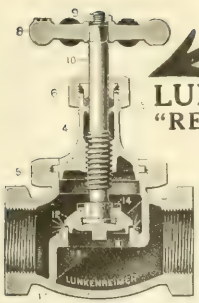

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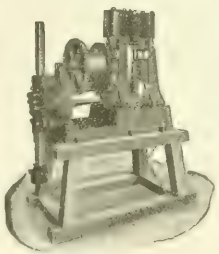

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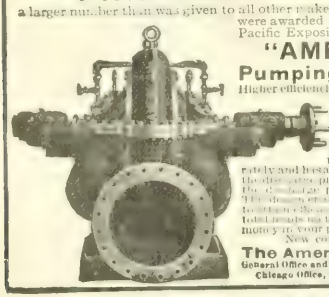

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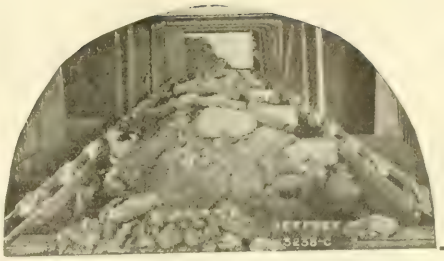

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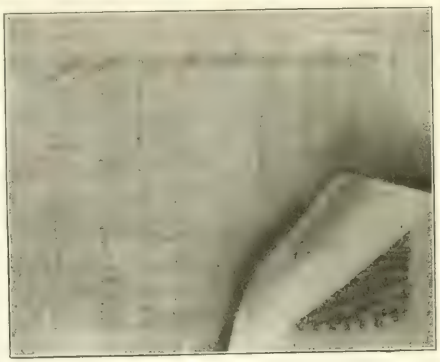

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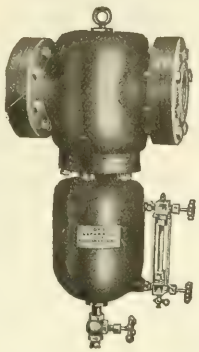

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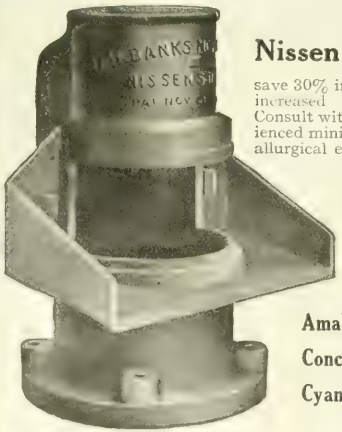

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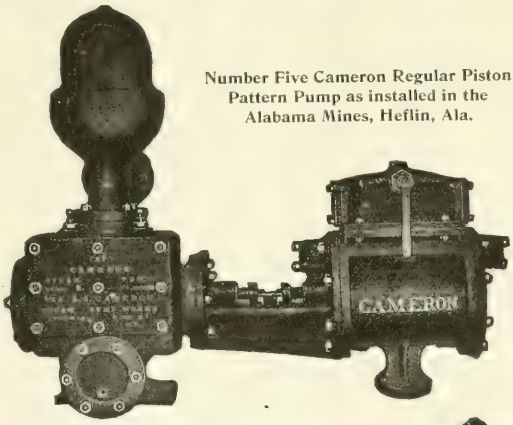

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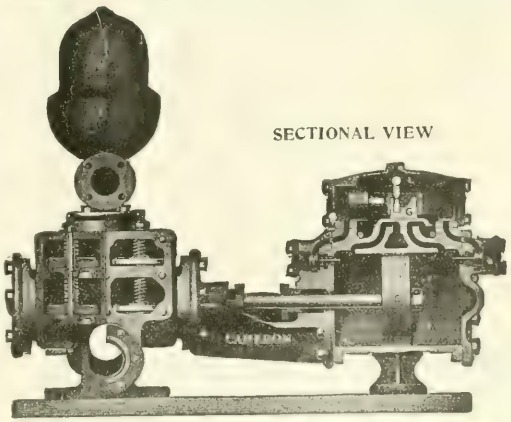

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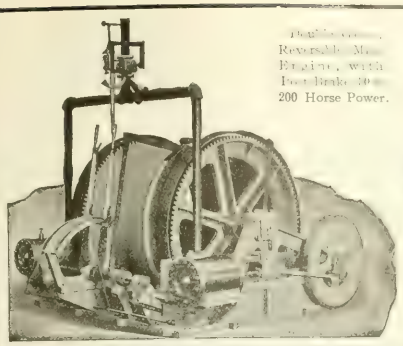

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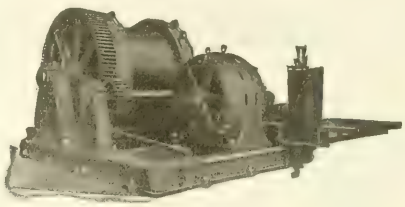

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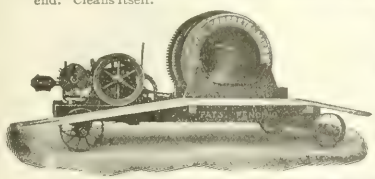

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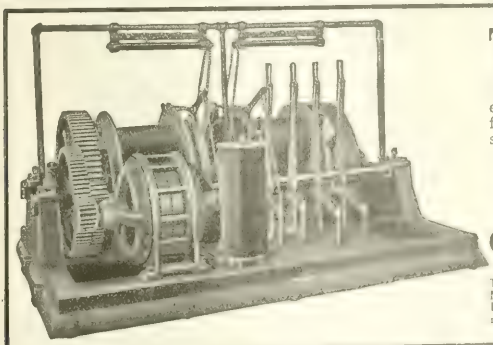

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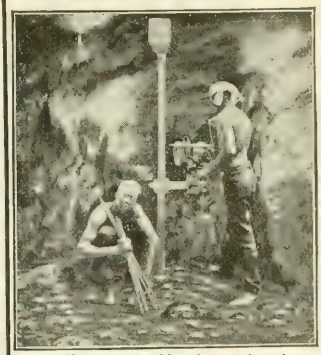

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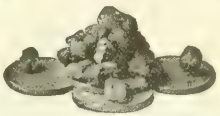

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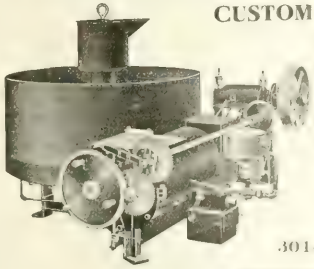

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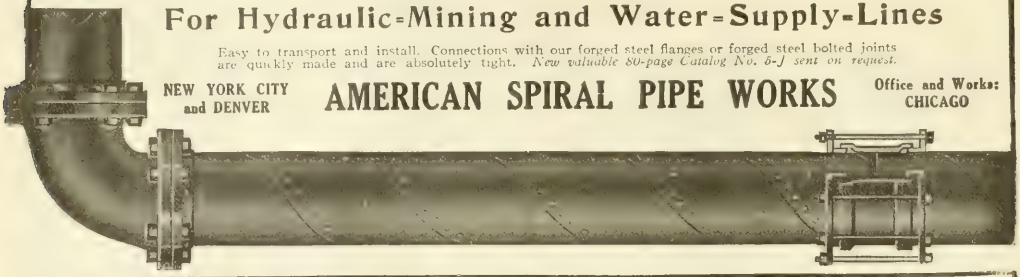

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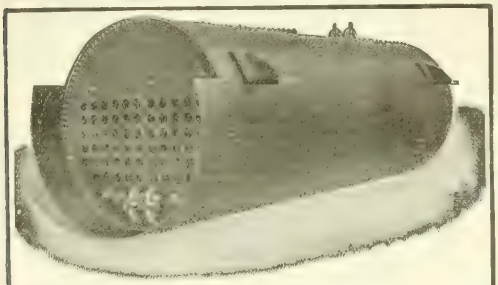

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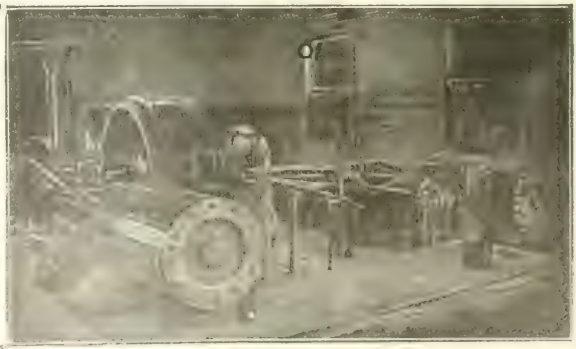

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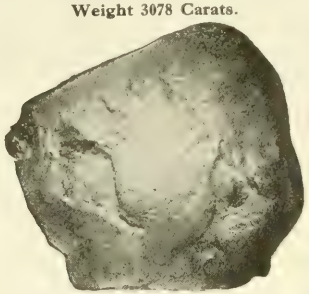

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* Illustrated

Freight Rates and Ore Treatment.

[illegible] one that must sooner or later be considered seriously by mine managers in [illegible] to be continued at a profit. There are many mines in camps from which the cost of transportation of ores is so high that by the time the ores are mined, the freight to outside reduction works, and treatment charges at a custom plant are paid, little or nothing is left for profit. [illegible] such a state of affairs means that the industry cannot prosper in districts so situated until means are devised for reducing these burdensome expenses. Mines producing rich ores may keep in profitable operation even under such adverse conditions, but those producing low grades only must often remain idle, as merely potential mines, until lower transportation and treatment rates warrant operation.

In a number of mining districts or regions this problem is being solved by the aid of local reduction plants, whereby the freight charges on the ores are eliminated. In the Cripple Creek camp, in Colorado, the practicability of local treatment of Cripple Creek ores has been demonstrated by the results at the new Portland and Stratton's Independence mills. This has encouraged independent shippers to organize for the purpose of jointly constructing and operating a local mill for the treatment of their ores. The Cripple Creek district has lately been benefited by a reduction in treatment rates at the plants of the U. S. Reduction & Refining Co., and the Portland Gold Mining Co., near Colorado Springs, amounting to $1.20 on average grades of ore. The Golden Cycle Co. is planning to meet competition not by cutting treatment rates at its Colorado City plant but by erecting an aerial tramway for the cheap transportation of ores from the Cripple Creek district to its valley smelter. It is estimated that the present reductions in treatment rates will mean a saving to the mines of the district of at least $50,000 per month. The natural result of this policy has been that there has been a largely increased demand for leases.

What [illegible] possible in the Cripple Creek district is possible also in other districts, which are struggling along under the burden of high [illegible] to permit [illegible] gold, the solution of the problem is simple, but with low-grade ores that must be treated by cyaniding or smelting processes, it is more complicated. The latter condition can best be met by the co-operation of small operators by the establishment of local reduction plants.

[illegible] similar to this is being taken by mining men of Boulder county, Colorado. The Metal Mining Association is [illegible] planning to erect two 50-ton custom [illegible] other of them will be accessible from [illegible] most important mining districts of [illegible] county.

The Native Liquor Question on the Rand.

One of the first and most noticeable results of the contact of savage races with civilization is the early acquirement of a taste for the white man's "booze," with all its disastrous consequences. The American Indians took readily to "fire water." The native mine laborers of South Africa took equally kindly to "cape smoke." The native liquor problem in South Africa has long been of a most serious nature and has been the subject of much discussion and legislation.

The South African natives like to get drunk, and when they can get the liquor a large percentage of them are constantly unfit for work. The problem there is not new, and was a matter for serious consideration before the late war. Mining interests had every reason to complain, as with the "boys" a good part of the time helplessly drunk or incapacitated for work, most economical mining was of course impossible.

The result of attempts to control the liquor traffic with the mine natives has proved about as effectual as have similar attempts elsewhere. The prohibition was spasmodic. The illicit traffic continued in defiance of the law, which, if rigidly enforced, should have been effectual.

The native liquor question on the Rand has lately been receiving considerable attention, and has been the subject of investigations and reports by Liquor Commission and the Mines Regulations Commission. As might be expected, the question of politics enters into the discussion which has resolved itself into a battle between the prohibitionist and trade interests. The Commission in its report, sided with the latter, and maintained that the use of [illegible] was not general. While [illegible] considered that these natives appreciate [illegible]

Prompt Aid for Injured Miners.

In the conduct of any hazardous occupation the importance of providing for the giving of proper and prompt attention to men who have received injuries is self-evident. Many lives have been saved by quick aid on the part of the injured man's comrades before it was possible to obtain the services of a physician. The value of "first aid" treatment is now generally appreciated.

Mining has earned an unenviable reputation for dangers to life and limb which beset the men engaged in it. Injuries of a more or less serious nature are of frequent occurrence, and for that reason the need of preparation for giving first-aid treatment is greater than in almost any other business. If it were possible every mine worker should be made familiar with the simple, though often highly important, operations of caring for injured men. Severe injuries are often received with no warning, whatever, and the duty of caring for the injured man devolves on the first man on the spot. Often, if the life is to be saved, quick and intelligent action is absolutely necessary. No matter how willing a comrade is to give assistance, if he does not know what to do, he might as well be absent.

In cases of injury to important blood vessels which cause hemorrhage the loss of blood may be checked by means of pressure on the proper blood vessel by means of the hands, or by the application of compresses or tourniquets made from materials at hand, such as a knotted handkerchief or strip from a shirt, etc. It is rare that something cannot be done if the person present knows the proper thing to do.

It is manifestly impossible to train all the employes at mines in this work, but at many of the large mines corps of the most competent employes are given first-aid training and are ready to act at the moment their services may be necessary.

Such provision is not intended to supplant medical aid, but is merely to assure temporary assistance until the physician can be called, or the patient taken to the hospital.

The Cripple Creek Drainage Tunnel.

After three and one-half years of strenuous work the Cripple Creek drainage tunnel has at length passed through the rim of the Cripple Creek volcano. The energy and persistency with which the work has been carried forward is worthy of the name by which the Cripple Creek drainage tunnel is officially known. The influence of this drainage tunnel will be felt all over the world, since the addition of $300,000,000 to the gold supply of the world must be felt eventually in every great financial center.

The immediate effect, however, will be to give a great stimulus to mining in Colorado. It is almost unquestionable that the drainage of the Cripple Creek district will mean an addition of 1000 working men in the district next year. These will add at least $3,000,000 to the output of the district in 1911.

The effect of the Roosevelt tunnel, as it is known, will be far reaching indeed. The employment of 1000 extra men in Cripple Creek will relieve the pressure of finding work by the miners of all other districts in the state. More miners are searching for work in Colorado than there are positions to fill. The steady employment of 1000 men in Cripple Creek means an addition of $1,000,000 to the pay rolls. Most of this will find its way into the channels of commerce and, although not a large sum, it will have the undoubted effect of stimulating trade in the commercial centers of Colorado.

Finally, with the reopening of the lower levels of the mines there will be a great deal of new equipment and material required. A number of Cripple Creek mining companies have held guarded in their treasuries large sums of money anticipating the time when large expenditures would have to be made in the equipment, etc. This money will be released and get into the hands of the community at large.

Finally, the large stockholders and owners in the Cripple Creek mines will have, once more, large sums to invest not only in local mining enterprises, but in new mines and districts outside. The mine owners of Cripple Creek not only have local interests, but many of them have large sums invested in Mexico, Arizona, California, Nevada and indeed in nearly every western state. The Roosevelt tunnel, therefore, is not only of benefit to Cripple Creek, but indirectly will tend to benefit mining all through the west.

The Disturbances in Mexico.

If the reports of disturbances at various points in Mexico are true, or are even one-half true, the situation is, indeed, serious and may at any moment develop into revolution. The disturbances, beginning with the demonstrations against Americans in Mexico City, ostensibly in retaliation for the lynching of a Mexican in Texas, have spread to a number of cities. Riots and fights are reported from Zacatecas, Puebla, Neuvo Leon, Durango, Coahuila, Chihuahua and elsewhere.

Mexico under President Diaz's strong hand has developed a government which has, so far, been a practical guarantee of stable conditions, without which the rapid and great development of the country's mineral resources—its greatest asset—could never have been accomplished. This development has been done through the investment of foreign capital—American, British, etc., in the belief that a fair and stable government would continue.

A revolution or a threatened revolution would have a bad effect on the mining industry in the entire country. Although the government seems to have been taken by surprise, there is no reason to believe that President Diaz will not be able to maintain control of the situation, as long as the federal troops remain loyal.

There is now every reason to believe that plans are well under way looking to the consolidation of America's leading copper producers. The originators of the "big deal" are satisfied that an organization along the lines on which the U. S. Steel Corporation was formed and which seemingly met all the requirements of the anti-trust law, can be successfully brought about. Just what companies will be taken into the consolidation is not given out, but it is believed that but little change will be made from those considered a year ago, which include the new Anaconda properties in Butte, and certain properties in Arizona, Utah and Mexico and possibly one property in South America.

The first of three government mine rescue stations in connection with the operating collieries of British Columbia, are being established at Fernie. Arrangements are to follow shortly for similar installations at Nanaimo and Cumberland. It is the intention of the Mines Department also to install a central station at Middlesboro in the Nicola country, to support the colliery installations as required by the Ontario Coal Mines Regulation Act.

It is again being urged of American exporters that the methods of doing business with American buyers are generally quite different from those that must be used with foreigners. It should be remembered that failure to comply with all requirements, expressed or unexpressed, will count against the exporter and it behooves him to make a thorough study of all phases of his foreign market

The Cripple Creek Drainage Tunnel, Colorado.

By A. W. WARWICK.

The great event of the year in Colorado mining circles is the tapping of the deep-water levels of the Cripple Creek district by the Roosevelt tunnel. This great drainage tunnel was commenced May 11, 1907, and has since been persistently driven until now has passed through 3 miles of the hardest and toughest granite in the Rocky mountains. The work accomplished is a matter of pride to all mining men. It was initiated by mining men, financed by them during a time of commercial panic, and has been carried through with a speed and accuracy of alignment that causes it to be a permanent monument of the skill of the present-day mining engineers.

When finally completed, the tunnel will have a length of about 5½ miles. It will permanently drain the district to a depth of 1288 ft. at the El Paso mine on Beacon hill, 1640 ft. at the Elkton mine on Raven hill, and about 2100 ft. at the Vindicator on Bull hill.

The Roosevelt tunnel will add over $300,000,000 to the production of the district. It is safe to say that 1000 additional men will find employment in the district for at least 20 years to come, by reason of its drainage.

Cripple Creek was originally a dry camp. During its early years, the cutting of a water vein was nearly as valuable as a vein of ore. The Bluebell tunnel, driven originally for development purposes, cut a flow of water which varied from 200 to 400 gals. per minute. This tunnel was valued as a source of water supply, and the discovery of this water gave a great impetus to local milling. It may be remembered that nearly all the early mills had to be built at considerable distance from the camp [illegible] were built near Colorado Springs and Florence on account of the lack of [illegible] in the Cripple Creek district.

But with development condition [illegible] idly changed, and within three [illegible] after the district was really discovered, at least one mine closed down owing to [illegible] year the C. O. D. remained closed in [illegible] per minute.

It became apparent at a very early date that enormous volumes of water would have to be handled [illegible] be kept open. In 1896 the first of the drainage and transportation tunnels was completed and gave immediate relief to the deeper mines of the district. This was known as the Ophelia or Moffat tunnel. How wet the district really is may be appreciated by the fact that it has been estimated that the district requires the removal of 50,000,000 gals. of water for every foot gained in depth. This means an expenditure of from $7500 to $10,000 pumping expense alone for every foot of depth gained.

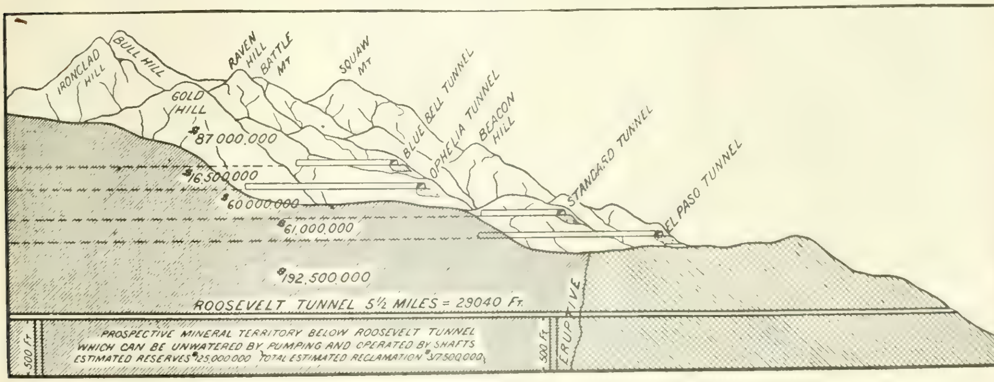
Within three years [illegible] the discovery of the district the mines were pumping [illegible] water a day [illegible] The burden of expense was terrible, and the [illegible] companies like the [illegible] Elkton, El Paso, Portland and Stratton's Independence. [illegible] ecount of water.

[illegible] Cripp [illegible] relief from [illegible] formation of a tunnel company, the entire stock of which was subscribed by the mining companies of the district.

On May 11, 1907, work on the tunnel was officially commenced and the event was regarded as important [illegible] made the object of a general mining celebration. In spite of the [illegible] start month elapsed before work [illegible] got under way. Contractor after contractor ceased work on account of not being able to make the required headway in the hard, seamless, Pike's Peak granite through which the tunnel runs. It seemed as if the engineers who had reported on the scheme originally had erred greatly in their calculations, or had allowed their optimism to overreach their judgment. David Brunton estimated the tunnel could be driven at an average rate of 300 ft. a month. The tunnel company required the contractors to make a monthly average of not less than 260 ft. The early contractors barely exceeded [illegible] these men were regarded as being among the most expert miners of the district. It was only when A. E. Carlton, a Cripple Creek banker and mining man, took hold of the enterprise [illegible] that the tunnel company began to see the possibility of the engineers' estimates becoming realized.

Mr. Carlton secured the services of J. H. [illegible] who had had considerable experience in tunnel driving. The shape of the tunnel was changed from [illegible] 7 ft. wide to [illegible] ft. wide and [illegible] high, with a [illegible] drainage ditch [illegible]

[illegible] the tunnel advanced 211 ft., and omitting [illegible] monthly. The [illegible] six months of the first year's work [illegible] driven each month [illegible] Chas. Fuller. From [illegible] September [illegible] this



The Roosevelt Tunnel.

year, 3115 ft. [illegible] average of 346 ft. per month.

In view of the work accomplished to date, and the fact that the tunnel is already draining one of the most important mines of the district, and will, in a few weeks, enter the water-logged core of the Cripple Creek volcano, some notes as to how this tunnel has been driven, and what it is intended to accomplish will be of interest.

Colorado especially has a keen interest in this work from the fact that when the tunnel is completed, it practically means the continued supremacy of the state in gold production. Further than this, it means much to the business men of Colorado. The renewed activity of the Cripple Creek district will give several million dollars more business every year to the jobber, the merchant and to the banks and will afford a great deal of much needed capital for the development of other mining districts in the state. The completion of the Roosevelt tunnel, therefore, will not only insure a greater prosperity in business, but will also start a revival of mining in Colorado, and thus overcome the depression which has prevailed since the panic of 1907.

A Scene at the Breast of the Roosevelt Tunnel.

A visitor to this tunnel finds it hard to realize that the men working in the breast are establishing a world's record for tunnel driving. The men proceed about their work with such deliberation and apparent ease that nothing ex[illegible] appear to be going on. You [illegible] the men who [illegible] engineer [illegible] with the fact that the work goes on steadily and without [illegible] hast, ohne rast" (without haste and without rest). Another striking point about the crew is the peculiar personal pride that they take in the record that [illegible] Possibly the better disciplined force of men ever worked together. Undoubtedly the record made is very largely due to these facts. No one gets in another's way. Nothing is allowed to hamper a man so that he has to work desperately in order to make up for lost time. The whole crew seems to realize that every man is doing his part, and thus without noise and fuss, the work goes forward with a rapidity that is establishing a record for hard-rock tunnelling on this continent. These facts form a very high testimonial to the superintendent and foremen in charge of the work.

The granite through which this tunnel is being driven has the reputation of being about the hardest and toughest in the Rocky mountains. The rock is not as hard as can be occasionally found in Gunnison county, but on the other hand it is questionable if a continuous stretch of 15,000 ft. of similar rock can be found outside of the Pike's Peak quadrangle. The rock is known as "Pike's Peak granite." It is a pinkish rock composed of coarse crystals of red feldspar, very little quartz, and is marked by a general deficiency of ferro-magnesian minerals. In the whole stretch of tunnel the main characteristic to be noted is that the rock appears to be absolutely seamless. Thus soft bars are entirely absent, and the resistance of the rock to the explosive power of dynamite is at a maximum. In comparing records made on this tunnel with those made in others these facts must be kept in mind. The only rock that could compare with the Pike's Peak granite in hardness and toughness is the notorious [illegible] of Cornwall, but, of course, no such masses of [illegible] are found in Cornwall that can compare with the masses of the Pike's Peak district. It took a considerable length of time and much study and experience in order to learn how this rock could be broken. The first contractors attempted to break through the granite rim of the Cripple Creek volcano by sheer strength and determination. The problem could not be solved, however, in this way. Mr. McIlwee, in taking hold, studied the problem from every angle, and by the combination of skillful drillers, suitable appliances and appropriate explosives found that the ground would yield and allow him to exceed even the requirements of the contract.

The first step taken, as already noted, was to change the shape of the tunnel. As originally planned, a great deal of time was lost in the setting up. By changing the shape of the tunnel to 7 ft. high by 10 ft. wide, as against 10 ft high and by 7 ft. wide, and using a horizontal drill support, two set-ups of the drilling bar allowed the entire number of holes to be drilled.

Two rounds of drill holes each about 8 ft. deep were drilled every 24 hours In general, 22 holes with a total depth of 188 ft. were drilled on each shift. However, when very tough ground is being passed through, it is customary to put in six extra holes, making an additional depth drilled of 52 ft. The time consumed in drilling varies from six to eight hours per round.

The drill runners use the new water Leyner drill and greatly admire it. It is certainly a remarkable machine to be working in such hard, tough ground. The drill used can be handled easily by a man of ordinary strength, and indeed it looks altogether too light for the work it is doing. Yet day after day it is doing its work, and the statement has been made by some of the men connected with the work, that they believed that the record made is largely attributable to the No. 7 water Leyner drill.

In watching these drills at work one is struck by the rapidity with which the cutting edges of the drill bite the rock. Another point is the speed with which the steel can be changed. The chuck of the new water Leyner is simplicity itself. There are no screws to be loosened and tightened. The shank of the drill has two projecting lugs which fit into slots in the drill chuck. To change the drill, the chuck man gives the drill steel a quarter twist and pulls it out. To put in a fresh steel all the helper has to do is to thrust the shank of the bit into the chuck and give a quarter twist back The helpers change the bits in from one-half to one minute.

A great deal of attention has been paid to figuring out the number of steels needed to drill a hole. This is in reality a very important minor detail, since the drill runners demand that the bits must be kept sharp until they have done their share of the draft. Each steel is 2 ft longer than the preceding drill used and thus the long cut holes will require six lengths of steel, and all the others are given five. The diameter of the bits used at first is 2¾ ins. and the diameter of the last bit is 1⅞ ins.

All engineers recognize that for any record to be made, the blacksmithing must be excellent. Badly made and poorly tempered bits would be fatal to progress. The bits are all made by a Leyner

drill sharpener. This sharpener will turn out 150 absolutely perfect drill bits a shift. Two blacksmiths are employed on the day shift; one for sharpening and one for welding. The welder by means of a small steel hammer can weld enough steel for the entire 24 hours, so that the night blacksmith crew only needs one sharpener.

The system of drilling the holes follows the ordinary rules. There is the usual cutting holes in the center, a line of back and side holes and the usual line of bottom or lifting holes. The diagram shows the manner in which these holes are drilled. However, when extraordinarily hard ground is encountered, an additional six holes are drilled, two extra cutting holes and four holes drilled directly into the rock, and placed in a quadrangle so as to relieve the upper, bottom and side holes. The two right-hand lifters are drilled so as to look downward at a fair angle. This is for the purpose, of course, of assisting in excavating for the drainage ditch.

The drainage ditch usually follows within 150 ft. of the breast and this is drilled by machines set on tripods. This drainage ditch has kept back the progress of the tunnel by, possibly, 20 ft. a month, but it was undoubtedly a good policy to have the ditch carried along with the breast. In starting the work the horizontal drill bar is set between 2 and 2½ ft. from the roof, and from this setting the upper half of the round can be drilled without moving the bar. This arrangement allows the drill runners to commence work without waiting for the muckers to complete cleaning up, and by the time all the holes have been drilled from this position of the bar, the muckers have cleared away the dirt sufficiently to allow it to be moved to its lower position, and thus time is economized.

The explosive used is blasting gelatine 60 and 50% dynamite. The shots are fired with fuse. Electric firing has been tested but was not believed to be as satisfactory as fuse. The explosives used are made by the Dupont Co., and the fuse is the well-known Silvanite brand made in Denver.

The blasting gelatine is used in an identical manner with that of ordinary dynamite, but it being less sensitive, a very powerful cap must be used. It is customary to use a No. 20 blasting cap in the Roosevelt tunnel. In loading the cutting holes, from five to seven sticks of blasting gelatine, 1/14 by 8 ins. are used. On top of this seven or eight sticks of 60% powder are rammed, each stick being 1½ by 8 ins. In loading the relief cuts no gelatine is used, the primers being two sticks of 60% powder, the charge being completed with six sticks of 50% powder. The other holes usually are loaded with 12 sticks of 50% powder.

The order of shooting is, of course, fixed by the length of the fuse and the order by which they are "spitted." The cutting holes, one and two, have fuses about 10 ft. 6 ins. long. Holes three, four, five and six have their fuses 2 ins. longer. The last holes to be shot, of course, are the lifters—19, 20, 21 and 22. On these, the fuses are about 12 ft.

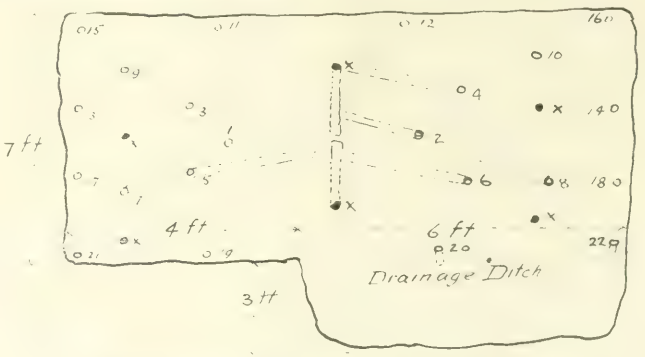
that the drill runners can get to work as soon as possible, with

Immediately after shooting the suction fan is started, and by means of a 16-in. ft. of the breast, the smoke is rapidly drawn out. Less than one-half hour after shooting the men can return to their work.

The use of these explosives, and the system of placing the holes, has been an important factor in making the records in this tunnel. From 25 to 40 tons of material are broken in each round according to the hardness of the rock.

In cleaning out the broken material from the face, the last few tons of material are used for weighting the sheet iron plates, which are laid on the floor before shooting. This materially facilitates mucking and allows the drillers to expedite the setting up of the drill bar.

The force of the explosion is so tremendous that unless there is from 6 ins. to 1 ft. of material on the iron plates they would be lifted and thrown back and badly crumpled. Of course, the material on the plates also acts as a cushion to prevent them from being unduly dented. The broken material is hauled out by mule over a single track. When a train of empty cars is brought up to the breast, the cars are unshackled, and the [illegible] on their sides, so that they rest on the sills over the water [illegible] the [illegible] of the empty cars clear the side of the rails [illegible] it is jerked back on the track, run to the [illegible]



A Section of the Tunnel, Showing Method of Placing Holes

engineers' profession. Purely engineering [illegible] Indeed, there are many features about such a stupendous piece of work that require notice, that numerous articles could be written about them. It is to be hoped that, in view of the importance of the work, [illegible] projects of a similar character, such articles [illegible]

Carborundum Fire Sand.

Carborundum fire sand has many valuable characteristics, according to a recent number of the Iron and Coal Trades Review. Among its physical properties it may be noted that it has a specific gravity of 2.7, is of a greyish-green color, granular, and easily crushed. Chemically, it is classed with the so-called silico-carbides, which are compounds of carbon and silicon, with or without oxygen. In an oxidizing atmosphere it slowly undergoes a surface oxidation. Carborundum [illegible] special interest to the foundryman on account of its wide use in the construction of brass-melting furnaces. With the introduction of fuel, oil, and gas-fired melting furnaces, new conditions were encountered which the various refractory materials heretofore employed could not meet. Certain portions of the lining were subjected to very high temperatures, under which ordinary firebrick, or even magnesite or chromite linings, entirely failed.

The most exacting conditions, however, in the matter of resistance to the temperature of the oil flame and the scouring action of copper and brass slags are met [illegible] dum fire sand. Mixed with the proper binding materials, [illegible] block, having no joints and presenting [illegible] refractivity and good mechanical strength. For this purpose silicate of soda is the binder most commonly used.

[illegible] and lead

The Late Edwin J. Hulbert.

BY GEO. F. EDWARDS.

In the recent death of Edwin J. Hulbert at Rome, Italy, there passed from life one of the greatest mining men of the early days—or of any day, for that matter not only in the Lake Superior region, but in the entire world. Even had he performed no other work—which is not the case—his discovery of the Calumet & Hecla copper mine in Houghton county, Mich., would have stamped him as a genius. This mine, easily the greatest on the globe, was opened in 1865.

Hulbert had the distinction of being the oldest living white person born in the upper peninsula of Michigan. His father, John Hulbert, settled at Fort Brady, Sault Ste. Marie, in 1821. The elder Hulbert was the sutler to the garrison. He was married at the Sault in 1827 to Marie E. Schoolcraft, sister of Henry R. Schoolcraft, historian, geologist and pioneer explorer of the Lake Superior country. Edwin Hulbert was born at Sault Ste. Marie April 30, 1829. Thus he was upwards of 81 years of age at the time of his demise. A portion of his boyhood was passed at Detroit.

It was through association with Schoolcraft that Hulbert went to the Michigan copper country in 1852. He was then 23 years old. He had adopted the profession of civil and mining engineer and was first employed at the old Cliff mine, in Keweenaw county. At that period it was the general belief that copper existed in paying quantities only in amygdaloid rock and fissure veins. Hulbert's discovery of copper in conglomerate boulders near Eagle river led him to the conclusion that the red metal would be found deposited in the conglomerate reefs of the district—once the beds of seas—in sufficient richness to permit of profitable mining. He continued his investigations and finally made certain discoveries which he held to verify his suppositions.

Hulbert had not been in the copper country many years when he purchased approximately 2000 acres of land from the government at $1.25 an acre. Included in this tract was the property now controlled by the Calumet & Hecla Mining Co. In August, 1864, while Hulbert was agent of the old Huron mine, now part of the Isle Royale, he employed the late Captain Amos Scott to open the lode which he had reason to believe in part traversed his lands. He directed Captain Scott to proceed to a point near the site of what subsequently was the Calumet No. 4 shaft and there to sink a test pit, the depth of which he specified. There was nothing on the surface at that particular location to indicate the existence of a copper-bearing reef, yet when 8 ft. below the grass roots, Scott and his men uncovered the Calumet lode. Hulbert afterward explained that due to certain geological features 2 miles distant and to carefully worked-out deductions he knew that the conglomerate was just there.

The discovery of the conglomerate was followed by the organization of three mining companies to work the lode, these being the Calumet, Hecla and Hulbert's Red Jacket. The two first-named companies controlled the outcrop for more than 2 miles, while the Red Jacket was located to the westward. The owners of the Calumet and Hecla properties felt satisfied that the Red Jacket must eventually come to them on their own terms, but Hulbert decided to open a mine there in his own way. His proposal to sink a vertical shaft to the conglomerate and then deflect the shaft to the angle of the lode was laughed at as ridiculous, but after the shaft was fairly started the feasibility of the plan was recognized by the owners of the outcrop and when the opportunity presented itself they acquired the Red Jacket mineral rights.

The early miners searched for fissure veins and had but hazy ideas regarding the conglomerate and amygdaloid lodes, which they called floors. Various attempts to develop mines on conglomerate reefs came to grief and it was for this reason that the possibility of opening a paying mine on the Calumet conglomerate was generally scouted by experienced mining men during the early days of the Calumet & Hecla. After that property had demonstrated its wonderful value, and thus effectually upset all previous theories regarding the conglomerates, public opinion veered to an exactly opposite quarter and many prospective bonanzas were opened on the conglomerates. None of them have ever paid, and at present a conglomerate proposition would receive but scant attention from any experienced mining man, unless the showing were of a truly phenomenal nature. With the single exception of the Calumet & Hecla, all of the big and lasting mines have been opened on amygdaloid lodes, and it is on these that every one of the new mines of the district, from Keeweenaw point to the Ontonagon river, are now being exploited.

That there are fissure veins which will yet prove as rich as the old Cliff, and contact veins which may duplicate the record of the famous old Minnesota, seems probable. It is even possible, though improbable, that conglomerates may yet be found which will give the world another Calumet & Hecla. It is of interest in this connection to note that it always was the claim of Hulbert that he had discovered a reef carrying even more copper than the Calumet lode. This lode has been styled the Tomahawk. As far as known, Hulbert never disclosed the existence of this formation and by most Michigan copper mining men the Tomahawk is regarded as a myth. Houghton county, during the days of Hulbert's activities, was covered with primeval forest, but for many years most of the land over which he conducted his explorations has been denuded of its trees and brought out into the open light of day, exposing every ledge and vein not covered by heavy soil. Practically every inch of outcroppings has been thoroughly scrutinized time and again, and as Hulbert did not have the diamond drill to assist him in revealing a geological cross section of that portion covered by heavy overburden, he must of necessity have confined his attention to the diabase outcrops, on which the geological studies of mining engineers have been concentrated for full 10 years, and they have been unable to discover this famous Tomahawk vein, or anything approaching it in richness.

Hulbert had lived in Rome for the past 30 years. While he was a wonderful mining man—it was he that put down the first successful vertical shaft in the Lake Superior copper district, this at the Cliff mine, a project that was begun in fear and trembling by the owners—he possessed but little business ability. He hypothecated his financial interest in the great property he had discovered, and he finally lost it. He was granted a comfortable annuity by his successors, based on the transfer of his mineral rights, nevertheless he became embittered not only at his former associates but apparently at the Lake Superior region in general and he sought solace in Italy. It was because of this embittered feeling that he is said to have kept to himself the secret of the alleged Tomahawk lode.

Even his opponents—and he had opponents, for he was a man of marked individuality and strong likes and dislikes—admitted that in mining and geological scope and foresight he was a wonderful man. His examination of the Michigan copper district was of the most minute and yet of the most comprehensive character, and his mappings have set a classical standard that has never been equalled.

Gold Sales in New York.

Returns for October from the United States Assay Office in New York show that the sale of gold bars throughout that commercial district for consumption in the arts and industries amounted to $2,759,316. This total is somewhat less than that for September, when the value of the sales was $3,023,138. It is also less than the October sales for 1909, of $2,947,993. It would seem that the maximum of this year was reached in September, in contrast with October a year ago. Below are given the monthly totals for the first 10 months of the current year and for the full 12 months of 1909:

	1910	1909
January	$ 1,982,186	$ 1,785,404
February	2,011,031	1,643,958
March	2,376,538	1,853,367
April	2,245,759	1,709,801
May	2,215,970	1,880,785
June	2,284,435	1,777,141
July	1,803,022	1,630,929
August	2,526,546	2,158,982
September	3,023,138	2,630,519
October	2,759,316	2,947,993
November	.....	2,508,153
December	.....	2,032,225
Totals	$23,257,944	$24,581,261

For 10 months ended with October the Assay Office sales were $23,257,944 compared with $20,040,883 for the first 10 months in 1909, or an increase of 15%.

In the handling of gold bars for industrial uses the Assay Office at New York figures favorably in comparison with the other next important point of Philadelphia, where sales are made directly from the Mint. Consumption of gold, including domestic bullion, United States coin, and foreign material for industrial purposes has been estimated by the Treasury authorities at about $31,500,000 a year. In recent years there has probably been some improvement in this total.

A Small Modern Copper-Smelting Plant.

By CHAS. C. CHRISTENSEN.

The size of a blast furnace is known by its internal area at the tuyere level. The limit of width was early found to be 54 ins. Furnaces have been built as wide as 60 ins., but the tuyere pipes, being water-jacketed, were then extended 6 ins. into the furnace, making the actual width 48 ins. No advantage was gained by this experiment, except that the limit of width was discovered. For the length, there seems to be no limit.

The capacity of a blast furnace depends to a great extent upon the quantity of fluxes needed, the volume and pressure of the blast (a wide furnace requires higher blast pressure than a narrow one), and the fusibility of the charge. Small rectangular furnaces will smelt approximately 3¼ to 3¾ tons of ore and fluxes per square foot area at the tuyere level; in larger furnaces the capacity per square foot increases. Following this rule, a furnace for copper ore, having say 120 tons capacity per 24 hours, with a width of 42 ins., should be 108 ins. long, giving an area at the tuyere line of 31.5 sq. ft. The cubic feet of blast required per minute is 260 × area, in this case 260 × 31.5 = 8190 cu. ft. The nearest blower on the market is one of 45 cu. ft. displacement per revolution, and 185 revolutions per minute = 8325 cu. ft. of blast per minute. We may figure on 16 ozs., or 1-lb. pressure, for a furnace of this size, and 5 hp. for each 1000 cu. ft. of blast needed, plus 10%.

$$\frac{8325 \times 5}{1000} + 10\% = 45.78 \text{ hp.}$$

To run this blower, then, use a 50 hp. electric motor making 650 rpm. The pulley should be 18 ins. diameter by 13 ins. face, and the belt 12 ins. by 5/16-in. thick, or 5-ply rubber belt.

Driving the blower direct from this motor the size of the blower pulley, receiving the power, should be $\frac{18}{X} \times 650 =$ 185, from which X is found to be 63.2 ins. The pulley, then, should be 63-in. diameter by 13-in. face. The belt speed will be $\frac{18 \times 3.14 \times 650}{12} = 3.061$ ft per minute, or 51 ft per second. At this speed a 12-in. by 5-ply belt will transmit 3.75 sq. ins. area of belt by 51 × 0.3 = 57.3 hp.; hence is ample to run the blower.

For a suitable sampling plant take the following machinery: One 7 × 10 crusher, 24 × 8½ ins. tight and loose pulleys to run at 250 rpm.; for this, 7 hp. will be required; one pair of 24 × 8-in. rolls, pulleys 60 × 8½ ins. and 30 × 8½ ins., to run 95 rpm., requiring 5 hp.; one pair rolls, 12½ × 12 ins., pulleys 36 × 8½ ins., 150 rpm., 3 hp. required; one sample grinder, 16 × 4½ ins., tight and loose pulleys, 150 rpm., 3 hp. required.

Allow 2 hp. for shafting, and use a 25-hp. electric motor, making 765 rpm., with 12 × 9½-in. pulley, and 9-in. × 5-ply belt. The circumference of a 12-in. pulley in feet is 1 × 3.14 = 3.14 ft. [illegible] belt is 9 × ¼ = 2¼ sq. ins. 40 [illegible] hp., and hence is ample to drive the sampling machinery.

The sampler plant [illegible] run say 150 rpm., and transmit 25 hp. Diameter of shaft will be

$$\sqrt[3]{\frac{25}{150}} = 125$$ [illegible]

Make length to suit sampler building. Diameter of pulley on line shaft to receive power is found from the equation $\frac{12}{X} \times 765 = 150$, from which X = 61.2 ins. Say 61 in. diameter, face to be 9½ ins. Diameter of pulley to drive 7 × 10 crusher will be $\frac{24}{X} \times 250 = 150 \text{ X} = 40$ ins. Face to be 17 ins. straight for tight and loose pulleys on the crusher; 8 in. × 4-ply belt to be used. Diameter of pulleys to drive 24 × 8 rolls will be $\frac{60 \times 95}{150} = \frac{30 \times 95}{150}$ [illegible] face to be 8½ ins., and = 19 × 8½-in. face; 8-in. × 4-ply belts to be used. Diameter of pulleys to drive sample grinder and 12½ × 12-in. rolls will be the same as on these machines, both running the same speed as the line shaft, 150 rpm. The pulley to drive the sample grinder, however, should have 9 ins. straight face for the tight and loose pulleys on that machine.

Next, to find the size of the generator necessary to run the electric motors, plus one dynamo for 100 16-c.-p. incandescent and four arc light. We have one electric motor delivering at the pulley 50 hp., one 25 hp. and one dynamo for electric light plant, 15 hp. Total 90 hp., to which add 15% for loss in motor and dynamo efficiency, and 10% for loss in transmission. Say the generator is placed 1000 ft. distant in the water-wheel house; then a generator which will transmit 114 hp. is required. Allowing 15% for loss in generator and 3% in transmitting power by belt from water-wheel to generator makes a total of 143 hp. to be delivered by the water wheel. Assuming that we have 220 ft. head in 700 ft. and 480 cu. ft. of water per minute [illegible] the water-wheel. The surface is 700 ft., hence the pipe line will be that length, and figuring 16 ins. diameter pipe, loss of head by friction will be 6 ft., leaving an effective head of 214 ft. This will give [illegible] rpm. The pulley [illegible] will require [illegible] diameter pulley on the water-wheel shaft.

$$\frac{20}{X} \times 214 = 65. \text{ X} = 66.$$

The belt speed will be 1.7 ft. × 3.14 × 650 = 3471 ft. per minute, or 57.8 ft. per second. Area of belt 18-in. × 8-ply = 9 [illegible] 9 × 57.8 × 0.3 = 156 hp., hence is ample to transmit full power to the generator.

The maximum pressure in the pipe line will be 214 ft. head by 0.433 = 92.66 lbs. per sq. in. Figuring a tensile strength of 60,000 lbs. for steel plates, a factor of safety of 3¾, and for double-riveted lap [illegible] 0.7 efficiency, the following equation will give the thickness of plate to be used [illegible] the pipe line

$$\frac{8 \text{ ins. radius by } 92.66\text{-lb. pressure}}{16{,}000 \times 0.7} = 0.066$$

[illegible] No. 16 steel plates, B. W. G., are 0.062-in. thick, and are the nearest to be had. Would make lower half of pipe [illegible] No. 14 steel, and the upper half No. 16 steel.

Blast Furnace.—All iron and steel work for one rectangular steel water jacketed furnace, measuring 42 ins. by 108 ins. at the tuyere line for smelting copper ores, complete in details as follows: The curb to be built of steel plates, strongly braced with steel angles, and provided with proper slag and copper spouts; curb to rest upon a heavy cast iron bottom plate, supported by six short cast iron columns. Resting upon the curb will be the steel water jacket 6 ft. 6 ins. high, with four side and two end jackets, leaving, when assembled, a smelting space of 42 by 108 ins. at the tuyere level; the side jackets only to be boshed; the lower part of these jackets 18 ins. from bottom to be straight, the upper part departing from the vertical 3½ ins. in 60; both the end jackets to be straight 6 ft. 6 ins. high, and to be provided at their lower ends by a semi-circular, cut-out of proper size to accommodate a tapping jacket; all jackets to be of flange steel, the inside plate ⅝ in., and the outside plate 5/16 in. thick; all joints flanged, riveted and caulked and the water jackets to be tested to a few pounds pressure, to see that they are perfectly water tight; all jackets to be provided with hand holes, flanges for inlet and outlet water connections, all necessary binders and bolts, and a complete set of piping, valves and fittings, necessary for supplying cooling water and for conducting discharge water to pockets cast on the supporting columns of the [illegible] each end jacket to have four tuyeres, making 16 tuyeres in all, each 4 [illegible] and connection to bustle pipe. Bustle [illegible] to be 16-ins. diameter with an inlet [illegible] ins. diameter, made of No. 14 steel, and supported from mantel frame of the furnace.

Above the jackets, to support the upper [illegible] work, a mantel frame, made of 8-in. I beams, should be placed, consisting of

765 revolutions this would give a speed of 765 × 3.14 or 2402 per minute — 40 three I beams on sides and ends, connected by steel angles at corners, and provided with cast iron spacers between the beams which must be bolted together. This mantel frame is to be supported by four cast iron columns 11 ft. 4 ins. high, 8 ins. outside diameter, 1 in. metal, with 16-in. sq. caps and bases, and pockets cast on for receiving the discharge water. Or instead of cast iron columns, structural steel columns, made up of Z-bars could be used.

A cast iron deck plate to be furnished to rest on mantel frame, to support brick work to and above charging floor. Brick work of shaft from deck plate to charging floor to be provided with a sheet steel casing; charging floor plates to be ⅜-in. checkered steel, extending 4 ft. on each side of the furnace, and 18 ins. at both ends. Above the charging floor will be a sheet steel hood 4 ft. high, each side of which is to be provided with a charging opening 4 ft. 6 ins. wide; cover of hood to be made of steel, cone shaped, 3 ft. 2 ins. high, and resting upon this will be a steel stack 42 ins. diameter by 24 ft. 6 ins. high, provided at top with a damper. Brick stack casing to be made of 3/16-in. steel, hood and cover of No. 10 steel, and stack of No. 12 steel.

The general dimensions of the furnace will be: inside of jacket at tuyere level 42 ins. by 108 ins.; floor level to top of bottom plate 2 ft. 5 ins.; floor level to top of curb 4 ft. 3 ins.; height of jackets 6 ft. 6 ins.; floor level to charging floor, 14 ft. 3 ins.; floor level to top of stack 45 ft. 6 ins. Furnace should be erected in the shops of the contractor, and all parts properly marked and fitted into place, so that same may be easily assembled at destination.

The Blower to be of the 2-impeller type, belt driven, 45 cu. ft. displacement per revolution, 185 revolutions, 63 by 13 in. pulley, top discharge. One rubber belt to drive blower to be furnished.

The blast pipe to be 24-in. diameter, tapering to 21 ins. at the blower end, made of No. 14 steel, with flanges at both ends, bolts and gaskets for connections, and a relief valve. The blast gates should be two in number, one at the furnace, 24-in. diameter, and one at the blower 2-in. diameter; one 36 by 48 by 24-in. rectangular cast iron forehearth, made of 1-in. well-ribbed plates, mounted on four unflanged wheels, and provided with cast iron spouts. Twelve cast iron slag pots, 2-cu. ft. capacity, complete with wheels, provided with roller bearings. Wheels to have cast iron rims and wrought iron spokes. Three steel charging barrows, each having a capacity of 10 cu. ft.; wheels provided with roller bearings; two 2-wheel coke charging barrows, complete with wheels fitted with roller bearings; six No. 7 steel wheelbarrows; two coke forks; four No. 2 scoop shovels; 12 long-handled square pointed shovels; three sledges, 6, 8 and 10 lbs. respectively; 750 lbs. of assorted sizes and lengths of furnace bars; one 6-beam charging scale. Twelve cast iron dust-chamber doors and frames 24 by 24 ins. to be furnished for dust chamber.

In addition to the above specified machinery, there is, of course, required crusher, rolls and grinder for the sampling mill, as already mentioned above; platform weighing scales, wheelbarrows and the usual tools, and the shafting, bearings, couplings, pulleys and belting.

To the above specified machinery should be added: One steel water tank about 10 ft. diameter by 8 ft. high, to be placed near the plant on level with top of the water jackets. To take the water direct from the water wheel pressure pipe would not do, because modern furnace jackets are no longer provided with stay bolts (which burn out and cause endless trouble), consequently they could not stand any pressure. They are simply tested to 3 to 4 lbs.—merely filled with water—to see they are water tight.

Further specifications should contain one set each of blacksmith's, machinist's, pipe fitter's and carpenter's tools; repair parts for six months for the crusher, rolls, sample grinder; extra lamps and repair parts for the electric lighting plant; extra jackets, spouts and tuyere parts for the furnace; pipes and pipe fittings, duplicate valves of all sizes used in and around the plant; assay outfit, etc., etc. The approximate shipping weight of all the machinery is about 100 tons.

Development of Freezing Systems.*

In 1883 Poetsch sank the first shaft by the freezing method. The process is fairly well known. It consists, briefly, in boring a number of holes within a large circle around the future shaft, sinking pipes, and connecting them on the surface in a collective ring. The lowest pipe has a bottom, and the pipes are about 3 ft. apart, and set in a circle from 10 to 14 ft. greater in diameter than the final shaft. The rest of the process is that of any refrigerating plant. A salt or magnesium chlorate solution is cooled to 15° or 20°, and is circulated in the pipes under pressure by means of compressors and pumps. In this way the latent heat of the earth around the proposed shaft is drawn away, and a solid mass of frozen material is obtained, after which the shaft sinking may be begun.

In recent years the freezing system has made wonderful strides, and sinking of shafts of 1100 and 1300 ft. in sand bottom is nothing unusual. The fear that freezing beyond a depth of 650 ft. would have to be made by the section system, owing to the deviation of pipes from the perpendicular when reaching greater depths has been eliminated. Two instruments are now in use that give the deviation in fractions of an inch.

The principles of the Erlungenhagen and the Gebhardt plumb line apparatus are the same. Both have balanced pendulums which are guided in the one case by an electric current, and in the other case by clock work, and both of which mark points on a strip of paper passing them mechanically. By watching the position of these points, the changes from the perpendicular can be determined. Electro magnets at the sides of the instruments, and a clock work in the other case, prevent the pendulums from running out of position. When a marked change of the pipe position is noticed, auxiliary holes have to be bored, and new pipes sunk.

A noteworthy special case of freezing was that of shafts 1 and 2 in Baldur mines at Trier. The shafts had been sunk to a level of 445 ft. when a new stratum of sand and water was encountered. The shaft was not to be any narrower, being 20 ft. in diameter, and the depth had to be extended to 560 ft. The bore-holes could not be deepened to the desired depth, on account of the low temperature of the upper 445 ft. The upper part of the shaft, having been excavated to 383 ft., was now widened to a diameter of 23 ft. and to a depth of 435 ft under the protection of the frozen earth At the 435-ft. level a cast iron plate, 23 ft. in diameter with 26 holes cast into it, each of them slanting toward the outer part of the circle, was lowered. Joining these holes, 23 flanged sockets 10 ft. long, having the same slant, were flanged to the plate, and the entire new set of flanges concreted almost to the top, leading to the surface of the shaft. The slant outward caused extension of freezing pipe circle, which returned to the perpendicular through gravitational forces.

The freezing of the shaft of the Alexander mine is probably the greatest piece of work ever tried with this system. There is a steam engine with boiler plant and two 300-h.p. superheated steam locomobiles to drive ammonia compressors. Fourteen condensers with 12,000 sq. ft. of cooling surface, cool and liquefy gases coming from the compressors, while 11 refrigerating machines cool the magnesium chlorate solution. A 4-cylinder horizontal pump circulates the solution in the freeze holes of the shaft. The plant has a capacity of 450 h.p., with a freezing temperature of 15°.

*Abstracted from Vulkan.

Beginning of the World.

The following was abstracted from C. Hart Merriam's *The Dawn of the World,* chiefly devoted to a history of the Mewan Indians of California:

The Northern Mewuk say: "In the beginning the world was rock. Every year the rains came and fell on the rock and washed off a little; this made earth. By and by plants grew on the earth and their leaves fell and made more earth. Then pine trees grew and their needles and cones fell every year and with the other leaves and bark made more earth and covered more of the rock.

"If you look close at the ground in the woods you will see how the top is leaves and bark and pine needles and cones, and how a little below the top these are matted together, and a little deeper are rotting and breaking up into earth. This is the way the world grew—and is growing still."

There are 20,632 mineral claims in Chile covering 522,336 acres, of which 10,821 are copper, 3893 gold, 904 silver, 86 gold and silver, 530 gold and copper, 173 iron, 99 manganese, 32 aluminum, 1 antimony, 1 nickel, 4 mica, 338 sulphur, 1385 nitrate, 687 salts of potash, 399 salt, 4 diamond, 33 china clay, and 40 coal.

The Zinc Mining Industry of Tennessee.

By SAMUEL W. OSGOOD.*

The zinc district of East Tennessee was mapped in the years of 1896 and 1901, and is described in folios issued by the U. S. Geological Survey at that time. The maps show the district to consist of three nearly parallel zinc belts, 40 to 50 miles long, and about 20 miles apart. These belts are each only a few hundred feet wide, and extend in a northeast-southwest direction, following the general strike of the Appalachian system of folds and faults.

The ores are contained in the Knox dolomite, a formation belonging, in part, to the Silurian and in part to the Cambrian series. In places local disturbances have given rise to cross-fissure zones of fracture. In these zones are the richest ore bodies. The ores are sulphides and they occur in the filling of the fracture zone or breccia, combined with calcite and dolomite and not in the rock. No barytes are present in these ores. Where the clay and sand of the surface is 20 to 30 ft. thick, carbonates and silicates are found to overlie the sulphide ores.

The central belt occupies the valley of the Holston river, and is called the Holston Valley zinc belt. This belt has ores containing zinc with no lead and less than 0.5% iron. The more northerly ore bodies, near the Powell river, and the south[illegible] carry both iron and lead.

The ore bodies along the northerly belt, which include the district in the vicinity of the Powell river, the Clinch river, and between these two rivers, near the city of New Tazewell, in Claiborne county, and in Union county, are extremely large. The ores are a compact "blende," or what is called zinc sulphide, being mined frequently in huge blocks several feet thick.

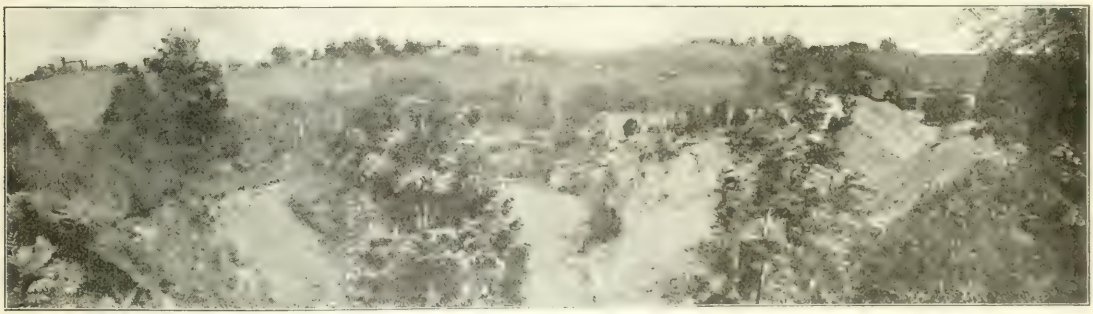
Straight Creek mine, near Tazewell, and other mines along this same belt all have bodies of high-grade zinc "blende," which is of the same nature as the above ores, carrying a little iron in the form of pyrite, which, added to its complex milling, also makes it difficult for smelting, for the purpose of making spelter or merchant ore. However, this ore could be smelted very successfully in a furnace for the purpose of making zinc white paint.

The southerly belt [illegible] which lies near the French Broad river, and which has been noted as high grade, near White Pine and Dandridge, [illegible] lead and iron, would be unfavorable for such a use, and [illegible] make the smelting [illegible] which rises when [illegible] Holston Valley would make excellent ore for smelting in a zinc white paint furnace.

Both the northerly and the southerly belts have lead, and some iron with the zinc in the ore. It is with the central belt that this article is principally concerned for here are the most extensive operations, owing to accessibility to the railway, and to the simple nature of the ores, which are more easily treated. The Tennessee Valley ores, which occur near Knoxville, have no lead nor iron in them and have an established reputation for being chemically pure for this reason.

The Holston Valley zinc belt is about 40 miles long, in a northeast-southwest direction, and from 50 to 700 ft. wide. Knoxville is about in the center of the belt. The Southern Railway's double track line between Bristol and Chattanooga traverses almost the entire length of the belt, hauling large amounts of

Mossy Creek Zinc Quarry, Jefferson City.



Branner and Carson-Newman College Zinc Mines, Jefferson City.

[illegible] Tennessee coal, iron [illegible] Knoxville to the coast.

CHARACTER OF ORE.

Carbonate ores have been shipped from the district for many years. They occur in a bed of red and yellow clay, overlying the dolomite containing the yellowish blende. The shipments of carbonates have been spasmodic, and the future of the district will no doubt depend largely on the success of treating the sulphide ores.

*Abstracted from Bulletin No. 2, Tenn. Geol. Sur.

The East Tennessee zinc ores, while remarkable for their chemical purity and freedom from the undesirable iron and lead minerals usually found in zinc ores, have not until recently been of much commercial importance, owing to the low grade of the ore and the methods of milling. Actual results have shown that the cause for the lack of success was the small daily capacity of the plants, the hand-sorting of the ores bringing the cost per ton of the ore treated to an abnormally high figure. The crude method of building the mills also made steady daily operation over long periods impossible because of frequent and costly repairs.

Grasselli Chemical Co.'s Zinc Quarry, Newmarket.

The blende, while in large bodies of a brecciated rock, occurs in bunches or small seams as a filling in the breccia, of the fissure zone. The ore has in the past always been hand-sorted to give a mill feed assaying from 8 to 12% zinc. Recently, however, it is thought to have been demonstrated by large commercial operations that the entire brecciated mass can be mined and milled on a large scale in a modern concentrating mill, maintaining a fair grade of product.

FORMER METHODS OF WORKING.

The first mining and milling of the zinc blende ores on any considerable scale was undertaken by the Edes, Mixter and Heald Zinc Co., in 1883, at Mossy creek, Jefferson county. This first mill was erected to wash the dumps of blende cobbed from the carbonate ores, and was so successful that in 1885 an 80-ton mill, including crusher, rolls and jigs, was erected. This mill treated hand-sorted ore from a large quarry for several years. It was closed in the panic of 1893, but was reopened by the John Weir Lead & Zinc Co. in 1900, and operated for a few months. The small daily capacity and the crude equipment brought costs per ton so high that the mill was closed after a few months.

The second of these small unsuitable mills was erected by the Ingalls Zinc Co., about 1½ miles southeast of Newmarket, in 1898. The ore was quarried from near the surface. Here, again, the ore was hand-sorted, the capacity of the mill being small, like that on Mossy creek. The ore was sorted to about a 12% zinc before milling, and a high-grade concentrate was shipped, but the operating costs were very high per ton of ore mined, the cause being simply the inconvenient methods for handling too small a daily tonnage.

The third of these small mills was built by the Roseberry Zinc Co., about 1½ miles west of Mascot, in 1900. This mill was an advance on former plants, but the ore was still hand-sorted and in the quarry, one car of waste being secured for each car of ore.

The fourth of these small mills was built by the Holston Zinc Co., about ¾ mile west of Mascot, in 1903, and this was another advance, especially in the development of a more elaborate jigging system. This mill was, however, of small capacity, and the ore was still hand-sorted in the quarry.

The Holston Zinc Co.'s mill was partially re-equipped in 1907 along lines suggested by A. M. Hewlett, the president of the company, and operated under the writer's management. Mr. Hewlett's untimely death in 1907 had much to do with the Holston Zinc Co's failure to complete the re-equipment of the mill. However, the plant was operated in its incomplete state for several months, and shipments of concentrates were made on a scale not possible before that time in the East Tennessee zinc districts. This showed at once the correctness of Mr. Hewlett's judgment in demonstrating on a commercial scale that all it required to make a success of the Tennessee-zinc ores was large capacity to reduce the "per ton" cost, a mill elaborate enough to obtain the zinc in the ore and of a sufficiently stable construction for continuous daily operation. The last year's operations on the Holston zinc belt include, besides those of the Holston Zinc Co., the shipments of carbonate ores and prospecting of its blende ore deposits by the Newmarket Zinc Co., the Grasselli Chemical Co., the Tennessee Mineral Co., and the Osgood Exploration Co.

PRESENT OPERATIONS IN THE DISTRICT.

At the Holston property the ore is mined through a shaft at a depth of 160 ft. in large stopes 50 to 75 ft. wide and carried to a height of 40 ft. Another

Grasselli Chemical Co.'s Zinc Quarry, Showing Carbonate Ore Diggings.

level has been started above, and drifts have been started to allow of stoping at a considerable distance from the shaft. Mining is done by machine drills, operated by compressed air.

In this mine all rock is taken from the stopes for the entire width, no hand-sorting being done. All ore is dumped into the crushing plant and sent from there to the mill. The mill has three departments—a roughing department, from which a large amount of waste rock formerly picked out by hand is sent to the tailings dump, and both a fine and coarse finishing department.

The Grasselli Co., whose principal office is at Cleveland, O., has taken over the property of the Newmarket Zinc Co., and has shipped some 95 carloads of carbonate ores to its smelters, under the able management of W. A. Underhill. This property has now been operating over a year, and is one of the most extensive mining operations in this district. The ore is mined with steam shovel, and they are now planning an extensive enlargement of their mill.

The Osgood Exploration Co., of Knoxville, Tenn., has taken over a large territory, consisting of all the mines of the old Eades, Mixter and Heald Zinc Co., and some other properties, including a lease on all the properties of the Carson-Newman College, at Jefferson City, and the Holston mine, at Mascot, Tenn., and is now developing these properties. Three large steam drill rigs are at work. The holes are 6 ins. in diameter, and are anywhere from 75 to 300 ft deep (or more, if necessary, to find the ore), and while from 3 to 7 holes will frequently prospect a piece of land containing 40 acres, three times this number are frequently drilled. These holes make excellent wells when no zinc is found.

The Roseberry Zinc Co. started operations in 1900. Ore was quarried, hand-picked or sorted, and sent to the crude

Holston Mine Scene.

[illegible] done [illegible] a shaft [illegible] and was [illegible] the mill. The [illegible] the

centrates, under the management of Kenneth R. Ayer and N. Caswell Heine, 1 Liberty St., New York. John Cox is the superintendent. A [illegible] has been made, 165 ft. long and 40 to 50 ft. wide. The ore body was found at the surface and over the area it has been opened 50 to 60 ft. deep. The ore body is nearly horizontal, and is said to be 600

Holston Mill, Flat Creek, Tenn.

Osgood Exploration Co., and has recently been taken over by the Grasselli Chemical Co., which expects to erect a large mill on it.

The Tennessee Mineral Co. is operating its mine and mill at Newmarket, making regular shipment of zinc blende con-

ft. wide. The ore is in a brecciated zone, and several seams of blende of a foot to several feet in width will average high in zinc, although no doubt the entire ore body will average much lower, probably about the same as the rest of these ores when mined on a large scale.

The old works of this property consist of an open pit or quarry where the blende was mined for treatment in a small concentrator. The ore was mined and sorted in the quarry and hoisted up an inclined track by a small hoisting engine. It was dumped upon a platform to be again hand-picked and then fed to the crusher. There were two quarries, 80 ft. wide by 100 ft. long, and about 5 ft. deep. The new mill has been enlarged and rebuilt, and an aerial wire rope tramway built to handle the ores from the bottom of the quarry to the top of the mill bins. From these the ore runs automatically by gravity through the mill, where the zinc concentrates are prepared for the smelters.

The Valley mine is the best looking of the partially opened, but inoperative mines of the belt. This mine is at Friends, on the Southern railway, 14 miles from Knoxville. The ore body is opened by a quarry about 50 ft. long, 15 ft. wide and 10 ft. deep. The quarry is near Lost creek, and the blende appears at the surface of the ground where the creek has washed away the soil. The ore occurs in a brecciated fissure zone, and is in appearance identical with the Mascot and Newmarket ores. Carbonate ores have

been shipped from the clays of the subsoil on adjoining properties, which seems to indicate a large ore body on this property.

The Loves Creek mine, at Loves creek, 5 miles from Knoxville, was partially explored several years ago, and good ore was found. A 50-ft. drill hole showed ore all the way to the bottom. There is a good mill site with ample water for milling and good surface indications. This is at present among the inoperative properties.

Throughout the entire length of the zinc range from Knoxville to Jefferson City, wherever a creek has washed its way through the soil in crossing the ore zone, good blende may be seen in the bed of the creek.

SUCCESSFUL MILLING OF TENNESSEE ZINC ORES.

To A. M. Hewlett belongs the credit of first solving the successful methods for the treatment commercially of the East Tennessee zinc ores. It cost the owners of the Holston mine $150,000 to solve this problem, and finally they evolved a mill which gave commercial recoveries that for years the lack of had prevented the operation of Tennessee zinc mines.

The large size of the ore bodies gives the Tennessee zinc field more of the aspect of a manufacturing proposition with its enormous supply of the raw material. The range of zinc ore-bearing land comprises a strip a few hundred feet wide, nearly paralleling the main line of the Southern railway that runs between Chattanooga and Bristol for a distance of 25 to 30 miles. This strip containing the ore-bodies varies from 6 to 50 ft. wide, as is shown to be the case where it has been opened in a number of places for 2 miles in length, by a large number of drill holes, shafts with underground workings, as stopes and rooms and large open quarries. These quarries are 30 to 60 ft. deep, 30 to 100 ft. wide, and 100 to 300 ft. in length, all in ore. These ore bodies occur near the surface of the ground, and can be mined in large open quarries by steam shovels, with a simplicity that will make available the local supply of southern labor, that will give extraordinary low costs of mining. On the basis of 1000 tons per day, it is estimated that the costs of mining and transporting to the mill will be near 20 cts. per ton of ore.

SMELTING TENNESSEE ZINC ORES

The smelting of Tennessee zinc ores in Tennessee is inviting commercially, as is shown by the results of operation of the small smelter at Clinton, operated by the Eades, Mixter and Healds Co. Coal supplies in great abundance are procurable from many mines within 40 miles, having a railway freight rate of 75 cts. The freight rates on the finished slabs of zinc also are less from Tennessee to New York and the Atlantic coast seaboard points of consumption than from the western smelters. The market for sulphuric acid, the chief by-product of a zinc smelter, is close to Clinton, large amounts being used by the southern fertilizer works in Middle Tennessee. The Tennessee Copper Co., only in March last, closed a large contract with the fertilizer combination for all the sulphuric acid it could produce, which combine also uses large quantities of acid that are now shipped in from the northern smelting points in Illinois, Ohio and Kansas.

Lead Mine Bend Zinc Quarry.

The Tomboy Gold Mines Co., Ltd., under the management of the Exploration Co., Ltd., of London, reports for October. Mill ran 21 days and crushed 10,000 tons of ore, yielding bullion valued at $40,000; concentrates shipped, $30,000; total, $70,500; expenses, $45,500; profit $25,000, expenditures on permanent improvements, $2273.

The Iron-Ore Situation in East Texas.

BY WM. B. PHILLIPS *

On June 15, 1910, the first coast-wise shipment of east Texas iron ore left Texas City for Philadelphia, in the s. s. *F. J. Luckenbach*. It consisted of 568 tons and came from Cass county, on the line of the Jefferson & Northwestern railway. The shipment was intended as a test lot to be tried in a Pennsylvania blast furnace and was not intended as the immediate precursor of other and larger shipments. The results of the test were so favorable that contracts involving 1000 tons of ore a day can now be placed in eastern Pennsylvania.

The Texas Iron & Coal Co., with a capital stock of $5,000,000, has been organized by New York, Philadelphia and Texas people and a permit to transact business in Texas will shortly be applied for. This company has acquired 52,000 acres of iron-ore lands in east Texas and proposes to engage in the business of mining and shipping iron ore on a large scale.

There are two outlets for this ore, disregarding such shipments as may go by rail to St. Louis or to the Birmingham district, in Alabama. These are from the ore fields by rail to some gulf port, Port Arthur, Beaumont (later), Bolivar or Texas City, and from the ore fields to some point on the Mississippi river, such as Vicksburg or Baton Rouge.

It depends to a large degree upon the railroads contiguous to the ore districts whether this ore will go out through a Texas port or down the Mississippi river in steamers by way of New Orleans. If the railroads will give a rate of $1 a ton to tide-water it is likely that the greater part of the ore will go out from some Texas gulf port. If they will not do this it is likely that the traffic will be diverted from the Texas gulf ports and seek an outlet by way of the Mississippi river and New Orleans. The traffic will not stand a higher rate than $1 a ton to tide-water, for the ore must be laid down at Atlantic ports at a total cost not to exceed $5 a ton.

The railroad haul to tide-water does not exceed 325 miles and a rate of $1 a ton means three-tenths of a cent per ton-mile. In the Birmingham district, Alabama, such traffic has been handled for twenty-five hundredths of a cent per ton-mile for distances of 100 miles. Applied to our own conditions this would mean a rate of 75 cts. a ton for a haul of 300 miles, so that it would appear reasonable to expect a rate of $1 a ton. The rate to St. Louis, 541 miles, is $2 a ton. Shipments have been made to Birmingham, 512 miles, for $2.20.

There is a very large tonnage of iron ore to be moved in the one direction or the other. The 300,000 tons a year can easily be increased to 1,000,000 tons a year, for the ore fields are practically inexhaustible.

Unloading and loading facilities are nearing completion at Texas City, and about $250,000 has already been expended there for the rapid handling of such ore as will naturally seek that outlet.

*University of Texas, Bureau of Economic Geology.

Portland Canal Mining District, British Columbia.

By NEWTON W. EMMENS.

(*Continued from page 959.*)

BITTER CREEK SECTION.

Bitter creek flows into Bear river from the east, 9 miles up from the head of Portland canal. Its valley is of a flat U-shape, with very steep sides, the bottom being filled with gravel and boulders. Two miles up from its mouth, the valley contracts somewhat where it cuts through a granitic dike, but opens out again immediately above. Five miles up, the stream branches, one fork going to the north and the other to the east where it terminates in a glacier, 2 miles above the forks. The valley of the main stream, and also of its east fork, has an average gradient of 100 ft. to the mile, but that of its north fork is very much steeper, about 800 ft. to the mile, is narrow, V-shaped, and has steep sides. Between the mouth and the forks several minor streams flow into the main creek from the mountain sides, where they have been scored by snow and rock slides. These streams sometimes occupy small canyons, ard are often a series of cascades and waterfalls right from the summits of the mountains, 3000 to 4000 ft. above, down to the main creek. A wagon road has been "slashed" for about 2 miles up the north side of the creek, and a trunk trail built from there to the forks.

The Old Chum Group.—On the north side of the East fork a number of claims have been staked along the course of a vein carrying auriferous pyrite. The most work has been done on the Old Chum group, which is situated on the mountain side north of the glacier, and above it, where the vein is exposed in a draw 2 miles above the forks. The work done consists of open cuts and prospecting drifts, showing the vein to be 8 ft. wide and to assay, hand samples, 0.4 to 0.7 oz. gold. There is no pack trail from the forks to the Old Chum, so supplies have to be carried in on men's backs from there to the property, following over the rocks along the edge of the creek to the glacier, then up over the ice to the head of the draw, where [illegible] allowed to the workings.

The Roosevelt Group.—On the North fork, 1½ miles above the main creek, and connected therewith by a fair pack trail, is the Roosevelt group, the claims comprising the first ones staked in the Portland Canal district by D. J. Ramey in 1899, who later allowed them to lapse and restaked them in 1902. The property extends from the creek 1600 ft. up the mountain side to the southeast, and 5500 ft. up that to the northwest, crossing the summit of a spur of Mt. Gladstone. The formation is slate cut by a felsite porphyry dike, having a westerly strike and vertical dip; on the south side of this dike is a quartz vein, containing crushed slate, from 2 to 6 ft. wide, mineralized with pyrite, chalcopyrite and carrying gold and silver. This vein has been traced for several hundred feet up the mountain side, along its strike, by open cuts and shallow trenches. About 50 ft. above the creek, at an elevation of 1550 ft., a drift has been started on the vein along its contact with the dike. It is in about 10 ft., showing the face to be fairly well mineralized, with a gouge between it and the walls. A little native copper was noticed in some of the slate inclusions. Assay from the more mineralized portions of the vein gave trace of gold, 1.8 ozs. silver, and 5.6% copper, to 0.04 oz. gold, 1.5 ozs. silver and 12.38% copper. About 30 ft. below this drive is an old prospect drift, which is now inaccessible, being partly filled by the debris from the drive above. It is said to be some 80 ft. long, and to have crossed the vein diagonally, and cross the slate between [illegible] vein. The [illegible] ft. deep at this point, completely burying the [illegible] drift [illegible] nable work [illegible]

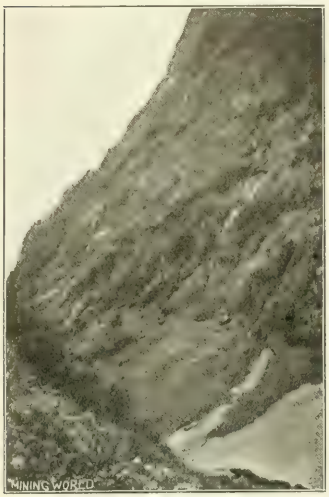
monthly. Some 500 ft. lower down the creek, a second vein has been uncovered. This is in a fracture zone in the slate, having a course of N. 65° W. and a southerly dip. Forty feet above the creek at an elevation of 1350 ft., a drift has been started on this vein, and is in about 6 ft., showing it to be 6 ft. wide, with a streak of galena, copper carbonates and pyrite against each wall, with slate between, more or less mineralized. These streaks are from 2 to 6 ins. wide, and selected samples from them assay 0.02 oz. gold, 20 ozs. silver, 24.7% lead and 1.5% copper, to 0.04 oz. gold, 47.2 ozs. silver, 40.5% lead and 3.41% copper. Judging from the course of these two veins they should intersect at no great distance up the hill to the west of the creek, where it is reasonable to expect that a shoot of ore will be found, as the formation is most favorable, the slate being highly carbonaceous.

Bitter Creek Mining Co.—About a mile below the forks of the creek, a branch trail leads off up the mountain side to the camp of the Bitter Creek Mining Co., at an elevation of 1600 ft., and situated on a sharp, narrow ridge between two deep gulches which have been scored in the mountain side by snowslides. From the camp a steep trail leads, by a series of switchbacks, to the basin at the head of the westerly gulch, at an elevation of 3000 ft., and 1000 ft. above timber line, where the slates are exposed. Here in a zone of mineralization, not far from the foot of a high bluff which forms the wall of the basin, a prospect shaft has been sunk 15 ft. There is nothing in the nature of a well-defined vein showing in the shaft, but a few fragments and nodules of galena were noticed lying on the dump, which evidently came from the shaft. Further down the gulch a crosscut has been driven about 30 ft. through the slate without encountering ore. Owing to the elevation and position it would only be possible to carry on work here for two or three months in the year, as snow falls early in October, and does not go off

View Up Bitter Creek from Ridge on West Side of Bear River.

Tongue from Glacier at Source of the East Fork of Bitter Creek.

again until the latter part of June or early in July, and the hillsides are scored and swept by snowslides all around, to say nothing of the difficulties of taking in supplies which must be packed upon men's backs from the camp, at the end of the horse-trail. In the gulch on the east side of the ridge, at an elevation of 2300 ft., is a drift 60 ft. long, on some quartz stringers in the slate, which show mineralization in spots of pyrite and chalcopyrite. In the west gulch, at an elevation of 1550 ft., a crosscut has been driven 40 ft. through heavy wash, and 25 ft. through a carbonaceous shale, to a bedded vein 4 ft. wide, consisting of a series of quartz stringers in the shale, and carrying a little pyrite and chalcopyrite. It has been drifted on for about 6 ft. but as it was found that the vein is crossing the gulch, and the portal of the



Looking Down Lydden Creek. Showing Workings on the Red Cliff "Big Showing."

crosscut is in danger from snowslides, work has been abandoned there and a new drive is being made from the opposite side of the gulch to catch the vein where it goes into the hill. There are several other workings on the property, but they show nothing of any importance.

Further down Bitter creek there are several other prospects on which work is being done, with more or less encouraging results, but were not visited by the writer owing to the exceedingly bad weather and the lateness of the season, Bitter creek being the last section visited.

Should any tonnage of ore be developed in the Bitter creek properties, it will be a comparatively easy matter to get it to tide water. The grade up the creek, and the nature of the valley being such that a spur from the railroad along the Bear river can be built as far as the forks of the creek at a relatively small cost, and it will be an easy matter to construct aerial trams from the mines to ore bins built alongside such spur. This line would only have to cross one snow-slide, a short one, where it might be necessary to construct snow sheds; the others could be avoided by crossing the creek and taking the opposite side.

It is at the head of the East fork of Bitter creek where the "mountain of gold" is located, which caused quite an excitement a few months ago, but which on investigation proved to be pretty much of a myth. About 4 miles up the glacier, over the ice, forming one of its confining walls, is an almost perpendicular bluff showing iron stain, which was found to come from the decomposition of iron pyrite contained in the rock and carrying a little gold. It was immediately staked and all sorts of wild stories circulated as to its value, causing quite an excitement for a time, and almost a stampede, but fortunately the Geological Department caused an immediate investigation to be made and published the results, showing that the ore carried only from $3 to $4 in gold, and was so situated above the glacier which covers several square miles, and so generally inaccessible that the find is of no commercial value.

LYDDEN CREEK SECTION.

This creek is almost 2½ miles long and enters Bear river from the northwest, about 12 miles above Portland Canal. From its source in a glacier, it flows almost due east through a deep canyon for three-quarters of a mile, then makes a sharp bend to the southeast and continues for another mile through a less formidable and wider canyon to the main valley, which it crosses to its junction with Bear river. The average gradient of this stream through the canyon is approximately 800 ft. to the mile.

Red Cliff Co.—Extending up the valley of Lydden creek to a little above the bend, is the property of the Red Cliff Co. On the southwest side of the creek a mountain rises with a slope of 55 to 65°, to a height of 5000 ft., on the face of which can be plainly seen brown mineral stains produced by the decomposition of iron sulphides. In one of these, which was easily accessible from the top of a pile of rocky debris fallen from the cliffs above, some shots were put in, disclosing a body of chalcopyrite, pyrrhotite and pyrite, carrying gold, now known as the "Red Cliff big showing." Here a drift, at an elevation of 150 ft. above Lydden creek, and 900 above sea level, has been run on the ore body in a S. 35° W. (mag.) direction for 69 ft., the floor, back and left side of the drive being in ore, but the right side shows only pyrite and pyrrhotite, without any copper and carrying low gold values. Near the portal of the drift a winze has been sunk 10 ft., showing the same class of ore as in the level, but carrying a little less copper. Fifty-seven feet in from the portal, a crosscut was made to the right to cut through what is supposed to be a "horse" of waste, but this is now blocked with ore taken from the drive and is, therefore inaccessible. Statements are conflicting as to the existence of ore in this crosscut, so that it is to be regretted that it has been closed up.

The formation in which this ore occurs appears to be an altered diabase, which is fractured by several sets of fissures having different courses and angles of dip. One set of fissures, having a course of S. 25° W. (mag.) are a little more prominent than the others, and seem to have been the main avenues of mineralization, but none of them apparently extend for any great distance in any given direction, so far as has been observed. Close to the portal of the drive, mentioned above, showing in the face of the bluff, is one of these S. 25° W. fissures, to the southeast of which the mineralization only extends into the rock for a foot or two, but to the northwest the rock is much fractured by cross-fissuring, which has allowed the mineral solutions to penetrate to a greater dis-

View Looking Southeast Across Lydden Creek Canyon from the Big Casino Mine.

tance and facilitated the deposition of ore. The more solid ore is found in close proximity to the main fissure, and gradually dies out into the country rock to the northward. So far as can be seen from an examination of the surface, the same conditions hold good in both an upward and downward direction, so that the ore bodies should be classed as lenses, rather than as ore shoots in a vein, there being no well-defined walls. It is impossible to form any accurate judgment regarding the extent of any one of these ore lenses, because aside from the few feet of drifting, crosscutting and sinking done on the "big showing," no development work has been done, and the actual boundaries of any of them remain unknown. Above the "big showing," on which the work has been done, other mineral stains appear on the face of the bluff which were said to be continuations thereof. On examination, however, they proved to be separate and distinct lenses of ore, separated from each other by barren rock, although occurring along a general line. These

lenses are not uniform in mineralization; some of them show very little copper, being composed of pyrite and pyrrhotite in quartz veinlets, reticulating through the country rock adjacent to the fissures previously spoken of, while others show quite a little copper pyrites mixed with the iron sulphides, but no work has been done on any of them beyond a shot or two here and there. The same remarks

View down Bear River from the International Mine, on Ridge Opposite Mouth of Bitter Creek.

apply to several other "showings" which were examined to the northwest, or up the creek. Numerous assays have been made from time to time of the ore taken from the workings on the "big showing" which yielded from 0.3 oz. gold and 6% copper, to 1.8 ozs. gold, 1 oz. silver, and 18% copper; while a "smelter test" on 1½ tons taken from samples brought down from the mine, from time to time for display in the company's office in Vancouver, gave 0.25 oz. gold, 2.44 ozs. silver and 8.25% copper.

Half a mile further up, where Lydden creek makes the bend to the west, on the north side of the canyon, is a zone of mineralization some 30 ft. wide, having an apparent strike of S. 70° E. and a vertical dip. The word "apparent" is used advisedly because, like the other mineralizations on the Red Cliff, this one has no well-defined walls. The zone has been opened at creek level by an open cut, showing a mineralization of pyrite and pyrrhotite. About 50 ft. higher up the face of the bluff, above the creek, a little galena and copper carbonates are found associated with the pyrite and pyrrhotite. This ore is said to carry high gold values, but no copper and only a little silver.

All the ore exposures are in the bluffs forming the sides of Lydden creek canyon, and in the winter time are frequently swept by snow slides, one of which is of considerable magnitude and runs from the glacier at the head of the creek down it for more than a mile and, from indications plainly seen on the mountain sides, is over 100 ft. deep. It is therefore impossible to work the property from the Lydden creek side except for about four months in the year. In order to overcome this a crosscut is being driven into the mountain from its base in the Bear

Main Workings at the Red Cliff Mine.

cipitous hillside at elevations ranging

shallow prospect shafts, and a number of open cuts along the outcrop, showing it to be from 8 to 12 ft. wide, with clean

ft. it gave out, and was succeeded by a

quartz gangue. At the bottom of the

Average samples taken from open cut No. 1 assay 0.06 oz. gold, 2 ozs. silver, 2.2% copper and 1.6% lead while those from the No. 3 cut, higher up the hill, gave 0.04 oz. gold, 1.6 ozs. silver, 2.7% copper and 1.2% lead. A drift has been run in on the vein a short distance below the lowest of the cuts mentioned above, and is some 30 ft. long, showing the vein to consist of quartz, carrying chalcopyrite and pyrite with practically no galena. Standing on the dump of this drift, at an elevation of 3500 ft. and looking northwest across the canyon, a fissure is observed cutting down the face of the bluff. This break is on the direct strike, with a similar dip, and is believed to be the continuation of the Ouray vein, which is probably the case, but has not yet been actually proved by prospecting

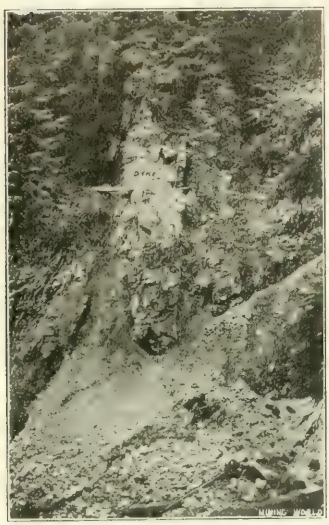
pipe is carried along the roof for ventilating purposes. Three shifts are employed of two miners each, operating one 3½-in. Rand drill, and three cannon on each shift. It takes about 18 hours to drill a round of holes.

The Red Cliff. Next to the Red Cliff mine on the west is the property of the

The second vein has been located to the west, but was not visited owing to the ground being covered with snow. It is said to be of a similar character to the Ouray vein, described above.

To the northwest of the Big Casino, just south of high peak, is the Red Cliff

Extension. The continuation of the upper vein of the Big Casino is said to traverse this property near the crest of the hill at an elevation of 5000 ft., but owing to the ground being covered with 6 ins. of new snow, was not visited. Lower down on the mountain, at an elevation of 4500 ft., is a small mineralized zone following a fracture in the country rock having a course of N. 55° E. (mag.), with a vertical dip. The ore occurs in the fracture and branching seams over a width of 4 ft., the mineralization is chalcopyrite and pyrite, in a gangue of quartz and calcite. It has been opened at surface, up the face of a steep bluff, where it is exposed in a shallow draw, by stripping for about 80 ft., showing some bunches of chalcopyrite, copper carbonates and pyrite at the intersection of the seams and the main fissure, but not in any quantity. Immediately below this surface work a



Vein and Dike at Roosevelt Mine on North Fork of Bitter Creek.

prospect drift has been run in along the strike of the vein for about 50 ft., showing on its north side, some stringers of calcite containing a little chalcopyrite. These workings, 1500 ft. above timber line, are buried deep in snow for 9 to 10 months in the year, in addition to being in danger from snow slides.

With the exception of the Red Cliff, to which a spur from the railroad along Bear river will be built, the properties along Lydden creek have a serious transportation problem to solve, owing to their situation high up a steep mountain side, above timber line, exposed to slides and with the surface free from snow for only two to three months in the year. The only practical way in which they can be worked is through crosscuts 1500 to 3000 ft. long, driven from the base of the mountain, which would tap the veins at a depth of from 1500 to 2000 ft. below the outcrop, according to the location of the portal.

BEAR RIVER SECTION.

The Main Reef.—On the east side of Bear river, several claims have been located, but little work has been done on any of them, except on the Main Reef, situated at an elevation of 1500 ft. about 1½ miles north of Glacier creek, and a mile east of Bear river. The formation is slate, and in a creek which apparently follows along a fault plane, a vein has been exposed occupying a fissure on the west side of a felsite dike. On the south side of the creek this vein has a course of S. 25° E. (mag.) with an almost vertical dip. What is apparently the northwesterly continuation of this vein is found 250 ft. to the west, down the creek, where it shows in the north bank. Considerable drifting has been done on both portions of the vein, which is well defined, of a brecciated structure, similar to those on the Stewart property, and it is generally regarded to be the continuation of one of these veins. The mineralization is pyrite and galena, of which a trial shipment made by the early prospectors of some four tons gave returns of 0.7 oz. gold, 20.94 ozs. silver and 23% lead, while an assay from a solid piece of the galena gave 0.3 oz. gold, 51.2 ozs. silver and 23% lead. The ore occurs in scattered bunches through the vein, there being as yet no well-defined ore shoot, but work is being pushed ahead with the expectation of encountering ore.

International and Portland Star.—On the west side of Bear river, opposite the mouth of Bitter creek, are the International and Portland Star groups. On this side of the river the mountain rises precipitously for 2500 ft. to a sloping terrace, and then continues in a series of bluffs and slopes to the summits, of which Mt. Wilkie is the highest peak. As previously explained, above this terrace, glaciers have deeply cut into the ridge, forming a number of transverse valleys and gulches, the upper portions of many of them being still occupied by ice, the color of which is a most beautiful blue.

The International property extends high up the mountain side, and in a deep gulch cutting across the diabase country rock, at an altitude of 2900 ft., is a mineralized zone having a northwesterly course and a southwesterly dip. Here the rock is seamed by small quartz veins running at various angles, carrying a little pyrite and chalcopyrite. Further up the gulch, which is very steep, at an elevation of 3400 ft., is a fissure occupied by a quartz vein from 6 to 10 ins. wide, having a course of N. 45° E. (mag.) and a vertical dip. A cut 8 ft. long has been run in on it, showing the quartz to be mineralized with a little galena. At the head of this gulch at an elevation of 3900 ft. above sea level is a basin occupied by a glacier of considerable size and thickness, the upper end of which rests against the base of a rugged, precipitous peak, whose summit towers 1000 ft. above. The gulch shows unmistakable signs of being swept by snow slides of formidable proportions. On the lower part of the International Co.'s property, at an elevation of 750 ft. above sea level, a drift has been started on a small seam of quartz, carrying pyrite and chalcopyrite.

About half a mile to the south of the International property, the Portland Star Co. is crosscutting for a quartz vein having a northwesterly course, samples from which show a mineralization of pyrite and chalcopyrite with, occasionally, a little galena. Assays of this ore (hand samples) show it to contain 0.02 oz. gold, 1.5 ozs. silver and 5% copper, to 0.85 oz. gold, 3 ozs. silver and 1.5% copper to the ton.

Portland-Bear River Co.—On the mountain side, above and north of the junction of American creek with Bear river, is the property of the Portland-Bear River Mining Co., where there is a quartz vein said to carry good gold values, and on which some work is now being done.

With the exception of the Portland mine, there is not a property in the whole

General View of the Big Casino from the South.

Portland Canal district which has yet passed the "prospect" stage, nor have any of them, with the one exception, been thoroughly and systematically sampled with a view to ascertaining the real average value of such ore as has been opened up by the small amount of work done. All assays quoted herein are from hand or "grab" samples, taken by more or less interested parties, the certificates of which were shown to the writer. But it must be remembered that the large majority of the properties have had only one season's development (about four months) and that chiefly along the surface of the veins or at shallow depth. These being the facts it is not possible yet to pass judgment as to the future of the camp as an ore producer. There are undoubtedly some promising prospects, but it will take careful, systematic development work, and require the expenditure of considerable capital, before they will reach the stage of steady, continuous production

Underground Electric Gathering Locomotives.

By FRANK C. PERKINS.

In the mines of the Upson Coal & Mining Co., third-rail electric cable reel gathering locomotives are utilized. One of these is shown in Fig. 1, this equipment being a 30-ton unit of the Jeffrey type, with reel on the end of the locomotive. Fig. 3 shows this type of gathering locomotive with cable paid out from the operating end and attached to the overhead trolley wire, the reel being mounted on the end, while Figs. 4, 5 and 6, show the same arrangement, each with the reel on top, the cable being paid out from the reel end, and from the operating end respectively, the current being taken from the overhead trolley as at the mines of the Pittsburg Gas Coal Co., and the United States Coal & Coke Co. (See Fig. 2.)

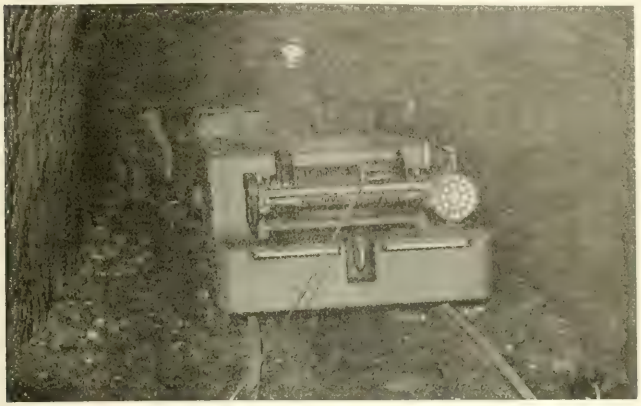


Fig. 1. Jeffrey Conductor Cable Reel Gathering Locomotive

It is maintained that the rapid handling of heavy cars in high rooms, and hauling them to partings, and the excessive cost of cutting haulage-ways in low veins, high enough for mules, have combined with other causes to bring about the electric gathering locomotive.

It will be seen that the distinctive features of the electric gathering locomotive shown in the illustrations is that it may be operated over tracks where there are neither trolley wires nor steel rails. This is made possible by carrying upon the locomotive a reel of flexible insulated conductor.

As soon as it is desired to run on track where there is no trolley wire, the cable is connected to the trolley wire, and the locomotive is propelled by current taken through the cable. The cable is automatically "paid out" as the locomotive runs away from the connection to the trolley wire, and automatically re-wound in even layers and with uniform tension upon the reel, when the locomotive returns. The locomotive is always provided with a standard trolley for use in portions of the haulage system where there is a trolley wire.

Where double entries exist, the gathering locomotive is provided with a third rail and two trolley poles, to operate in rooms on either the right or left hand entry, it being desirable to have the trolley pole close to the opposite the room turns. A double throw switch connects the motor to either the trolley or the cable circuits. All electric contacts and conductors are substantially enclosed in dust-proof compartments, and protected so that it is absolutely impossible for a man to touch them inadvertently.

From the illustrations, it will be seen that the cable reel and spooling device are mounted at one end or top of the locomotive, or on the end frame.

The cables are either a single 4 two conductor type, a cable with a single conductor being used when tracks in the rooms are laid with steel rails. The rails in such cases must be bonded or connected so as to form a continuous length to insure a good return circuit. For bonding the rails in the rooms, it is sufficient in many cases to simply clamp the bond wire between the fish plates and the rails.

It is stated that where the tracks in the room are laid partly with steel and partly with wooden rails, it becomes necessary in order to complete the circuit of the current required by the locomotive to employ a cable with two conductors. In such case, the steel rails do not require bonding.

It will be seen that the operation of gathering locomotives is assisted by the use of substantial track switches and frogs at the mouths of the rooms, and fish plates and rail bonds in the rooms are desirable but expensive. However, where steel rails are laid in rooms it is good practice to use U bolts to join the rails.

A "rail bolt bond," see Fig. 7, has been designed, which consists of a steel U bolt having at each end a tapered brass nut. The U bolt is made of such a length that the ends enter the rail bolt holes in the rails. By bending the bolt slightly, a considerable range of adjustment can be secured to suit the irregularity of the holes in the rails. No special reamer or drill is used in the holes. The ragged edge of the hole cuts into the brass nut, and not only makes excellent contact, but prevents the nut from working loose. The real advantage in the use of these bolts is that any workman can put them in place with a wrench, and they can easily be taken out and used again when the room is worked out.

The cable is hooked to the trolley wire far enough from the switch to allow the locomotive and the car to run out on the entry tracks, so that the trolley may be easily placed on the wire and the track switch thrown. The length of the cable is such as to enable the locomotive to run to the face of the deepest room after making such a connection to the trolley wire. In some cases two or more rooms can be entered without changing the con-

Fig. 2. Jeffrey Conductor Third Rail Cable Reel Gathering Locomotive

nection of the trolley wire. When such a plan is followed, the cable is made of the proper length for such service.

When about to enter a room for a loaded car, the motorman throws the controller lever to the "off" position, lowers the trolley pole and places the double throw switch into position for operating with current through the cable. When the cable is "paid-out" past the motorman, he attaches the cable hook to the trolley wire, but if the cable is paid out from the other end of the locomotive, the trip rider attaches it. As soon as the cable is attached and the track switch thrown to turn the locomotive into the room, the controller may again be operated, and the motors will take current through the cable.

It is of interest to note that frequently motormen and trip riders so time their operations that the locomotive does not stop either when entering or leaving a room, but merely slows down at the switch. The duties of motorman and trip rider vary with the arrangement of locomotive and with the system of gathering which is followed.

It will be seen that if the locomotive enters the room controller-end first, the motorman can generally make the coupling to the loaded car in the room, the trip rider throwing the switch and disengaging the cable when the locomotive again reaches the entry. After coming out of the room and disconnecting the cable hook from the trolley wire, the reel clutch is always thrown out. The clutch may be thrown out when paying out the cable, but the single direction reel is arranged to operate properly when paying out the cable, whether the clutch is in or out. If the clutch is left in when paying out the cable, the ratchet in the driving sprocket permits the reel to revolve independent of the rotation of the driving shaft.

It may be stated that with the double-direction reel the clutch is thrown out at all times, except when it is desired to wind the cable. By means of special gearing to drive it, the double-direction reel is made to wind up the cable when the clutch is thrown in, when the locomotive is moving in either direction. The double direction reel is used only where the cars are gathered by the same locomotive from both sides of the shaft or opening, where the locomotive is not turned end for end in passing from one side to the other. The necessity for such arrangement lies in the fact that if the locomotive is not turned end for end in passing the shaft or opening, it will have to run into the rooms on one side with reel end first, and on the other side with the operating end first.

Generally where the locomotives are obliged to operate on both sides of a shaft, track Y's are provided, and the locomotives turned end for end in passing from one side to the other. It may be of interest to note the construction of this unique reel mechanism. It will be seen that the reel is operated by a friction clutch which is positively driven by a silent-running chain and sprocket from the motor, the control of the clutch being placed within easy reach of the motorman at the operating end of the locomotive. The speed of the cable reel, when the cable is being wound up, is such that it tends to produce a slight tension in the unwound portion of the cable; or, in other words, the reel tends to wind up the cable faster than the locomotive advances on the track.

As soon as the tension of the cable is increased, the friction clutch allows the reel to slip, and thus prevents injury to the cable from excessive tension, and the clutch can be adjusted to produce any desired tension on the cable, about 25 lbs. being sufficient.

When the locomotive is running, the winding of the cable is positive, regardless of the speed, and that the locomotive can never run over it. When the reel is unwinding the cable, as when a locomotive is going into a room, just enough tension is automatically kept on the cable to prevent it from "kinking," should it have a tendency to do so.

The tension on the cable when unwinding is secured by the disc brake on the end of the reel opposite the clutch, and

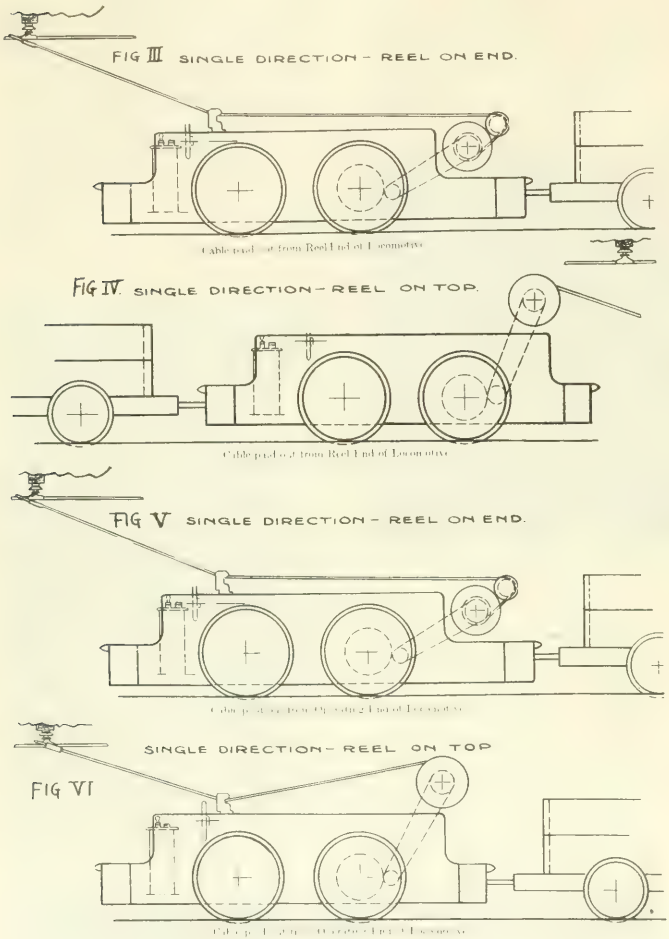


FIG III SINGLE DIRECTION - REEL ON END.
FIG IV. SINGLE DIRECTION - REEL ON TOP.
FIG V SINGLE DIRECTION - REEL ON END.
SINGLE DIRECTION - REEL ON TOP
FIG VI

Fig. 7. U. Bolt—"Rail Bolt Bond."

may be adjusted by increasing or [illegible] the number of springs which press the brake discs together.

It will be noted that with this device, the cable is not dragged over the ground, but is merely laid down as it is paid out, and again picked up as it is rewound upon the reel. As the cable is wound evenly upon the reel, there can be no rearing or cutting of the insulation due to crossed turns. The even winding of the cable upon the reel, is accomplished by a spooling device of simple, effective construction. Wooden rollers, which serve as guides for the cable, are mounted on a carriage which travels back and forth the length of the cable reel, at just the right speed to guide the cable into closely wound layers. The spooling device is positively driven and moves in the proper direction and reverses at the right moment at all times. The loose ends of the cable are provided with hooks for making connections to the trolley and rails, or in case a single cable is used, for making connection to the trolley wire only.

Goldfield Con. Co.'s Report.

According to the report of General Manager J. R. Finlay, the gross output of the Goldfield Con. mine and mill for October was $1,069,048, as compared with $843,224 in September. Profits for the month are shown to be $714,127, as compared with $563,966 in September. The 100-stamp mill of the company handled 25,471 tons of ore of an average value of $32.21.

The report of Mr. Finlay, in detail follows:

TONNAGE PRODUCED.

Mine.	Wet tons.	Dry tons.	Av. oz.* per ton.
Combination	4,978,000	4,699	1.62
Mohawk	8,963,330	8,469	1.09
Red Top	4,708,200	4,444	1.81
Clermont Milling ore	8,335,900	7,868	1.88
Clermont Shipping ore	315,605	293	39.71
Total	27,301,035	25,764	2.01

The gross values to be credited to the various mines are as follows:

Mine.	Values.
Combination	$ 157,322
Mohawk	190,604
Red Top	166,250
Clermont Milling ore	266,396
Clermont—Shipping ore	248,365
Total	$1,069,048

The performance of the mill was as follows:

Dry tons milled	25,471
Average value per ton	$32.21
Total value	$820,183.00
Loss in tailings	$ 81,640.00
Values realized	$738,492.00
Percentage extracted	92.12

EXPENSES.

General.	Amount.	Av. per ton.
Bullion tax and marketing bullion	$ 18,000	
Administration, etc.	20,000	
	$ 38,000	$ 1.48
Mining	$ 92,000	3.55
Marketing high-grade ore	21,000	0.81
Transportation	3,000	0.12
Milling.		
Milling and cyaniding	$ 62,850	
Marketing cone residues	13,280	2.42
Construction	60,000	2.33
Net cost	$200,230	$11.23
Loss in tailings	$ 64,691	2.51
Total costs and losses	$354,921	$13.78
[illegible]	$27.71	
[illegible]	$11.49	
[illegible] profit	$714,127.00	
[illegible]	66.80	

DEVELOPMENT.

The mine looks exceedingly good. The amount of advance measured in new headings in October is as follows:

Mine.	Feet.
Combination	474
Mohawk	1,501
Red Top	493
Clermont	1,251
Total	4,019

The total development done by the company for the fiscal year ending with October was 41,938 ft., not including that done by the leasers. The total dry tons mined in the same period was 266,867, so that the development has averaged 1 ft. for 6⅓ tons mined.

In October ore was taken from main levels as follows:

Mine.	Level.	Tons.	Average Ozs.
Combination	230	15	2.45
Clermont	1,000	740	3.28
Total		755	3.26

Some other new ore was discovered in the course of stoping, but not on main levels. The discovery in the Combination is probably far more important than the figures would indicate, for it points to an ore body lying parallel to the Hampton stope.

The ore body discovered on the 1000-ft. level is only partially developed. It appears to be large, of good grade, and of good milling qualities.

CONSTRUCTION AND EXPENSES.

It will be noted that expenses are high this month, largely on account of construction, of which a large amount has been going on since April. Heretofore, arbitrary amounts of these expenses have been charged off each month, with a view to getting rid of the whole account by the end of the fiscal year, but no exact estimate was made. With the end of the construction campaign so nearly in sight as it is now, a more accurate estimate is possible. In view of the large earnings for October, it seems best to write off the whole balance which we place at about $60,000.

There will remain some payments, perhaps to the extent of $80,000, to complete [illegible] undertakings, but these bills will not be paid for some time, and cannot properly be charged to this fiscal year.

[illegible] Copper & Hecla's October Production.

Calumet and Hecla's October production was 5,965,147 lbs., well up to the 1910 average, bringing the 10 months' total to 59,145,750 lbs., against 67,345,584 lbs. in the same period of 1909. The year's output will be close to 72,000,000 lbs., a 10% decrease from last year. The average recovery from the concentrate now has fallen from 500 lbs. a ton in 1900 to 32 lbs. this year. Applied to the present rock treatment (2,000,000 tons per year), this loss represents a loss in annual output of around 35,000,000 lbs. of copper, or $7,000,000 in sales at the 1910 level. The decrease in content has caused extra efforts to save copper formerly lost in milling operations.

Changes in Electrical Definitions.

The following new electrical definitions have been proposed by the Standards Committee of the American Institute of Electrical Engineers:

A compensated alternator is an alternator which automatically compensates for the drop in voltage in its armature, or in its armature and the line.

A synchronous compensator is a synchronous machine, running either idle or under load, whose full excitation may be varied so as to modify the power factor of the circuit, or through such modification, to influence the voltage of the circuit.

An inductor alternator is an alternating current generator in whose armature windings the field magnetic flux pulsates but never reverses.

An induction generator is a machine similar to an induction motor but driven as an alternating-current generator.

A rotor is a rotating member of a machine.

A stator is a stationary member of a machine.

Equalizing rings are rings connected to equipotential points of multiple-wound armatures to equalize the voltage between brushes.

A primary winding is that winding of an induction motor or of a transformer which receives power from an external source.

A secondary winding is that winding of an induction motor or of a transformer which receives power from the primary by induction.

A transformer-balancer is an auto-transformer for dividing a voltage in constant proportions, and usually into two equal portions.

An induction starter is a device used in starting induction motors, converters, etc., when they are started by voltage control, consisting of an auto-transformer in connection with a suitable switching device.

A leakage reactance is that portion of the reactance of any induction apparatus which is due to stray flux.

A synchroscope is a synchronizing device which, in addition to indicating synchronism, shows whether the machine to be synchronized is fast or slow.

A voltmeter compensator is a device used in connection with a voltmeter to reduce its reading by the amount of the line drop, and thus causing it to indicate the voltage delivered at the distant end, or at any other predetermined point of the line.

A watt-hour meter is an instrument for registering total watt-hours. This term is to be preferred to the term "integrating wattmeter."

Recording wattmeters, recording voltmeters and recording ammeters are instruments which record upon a time-chart the values of the quantities they measure.

Indicating meters should be rated according to their full-scale reading volts, amperes, or watts (at unity power factor in wattmeters).

Watt-hour meters should be rated by their power delivery at rated volts and amperes at unity power-factor.

Thumb Butte District, Arizona.

BY S. R. MC CORKELL.

When the early American prospector looked for placer ground, or searched for small pockets of rich ore, he did not tarry long in that section of the country now known as the Thumb Butte mining district. He saw, if at all, immense mineral deposits containing iron, copper, gold, silver, lead and zinc; a country with timber sufficient for every mining purpose; water for camp, mine and mill, and a district easily accessible to nearly every form of transportation.

The Thumb Butte district covers most of the country between Prescott and Skull Valley, about 15 miles to the west. To the south is the Copper Basin district. On the north is the Mint Valley district. The area covered by the Thumb Butte district is variously estimated at from 175 to 225 sq. miles. It is almost wholly within the government forest reserve, is well timbered and watered, and is one of the most accessible districts in Yavapai county, of which it is almost the geographical center. From east to west a railroad runs through its central part, while wagon roads, most of them in fair condition, run in all directions.

With these advantages the Thumb Butte is yet a prospect district. On the whole the ore bodies are not as high grade as would attract the early miners in the country, and was unfavorably regarded by them. With interests and energies devoted elsewhere from the first, it is easy to see how the district has remained comparatively undeveloped. But now that present-day miners in this section are looking for big ore bodies of medium, or even low grade, rather than rich pockets and veins of questionable size, the Thumb Butte district is receiving no little attention.

The general formation of the district is a granite-porphyry, containing much silica and hemitite of iron. The surface is broken, affording many excellent tunnel sites, yet it is not what is locally known as "rough." The hills are covered with a very good growth of pine, with many new trees coming in. Living springs occur in several places and most of the creeks and washes run water. Running in various directions wide mineralized belts may be traced for thousands of feet on the surface, and at hundreds of places the many fissure veins which occur in these belts crop out, showing strong in copper or iron or both. These croppings show especially good where some creek has cut the vein, but are exposed in other places also.

At one point in the district, and near the mountain from which it is named, one round of shots placed in a ledge near the surface loosened over 50 tons of paying ore which might have been taken from the ground as it lay and profitably treated at the smelter. At another place a shot placed in croppings dislodged an equal amount of richer ore, some being copper glance. Development work done in the district have disclosed some exceptionally good copper ore. At a depth of from 15 ins. to a few feet, gold values begin to show and increase as sinking continues. At one point, in an open cut, ore assaying over $24 per ton was found at a depth of 8 ft., and from all appearances there are thousands of tons of it.

The entire district is mineralized. Several assays of rock taken from the very top of Thumb Butte indicate that this entire butte would average close to $4 per ton.

While it is generally recognized as a copper-gold district, different minerals predominate at different properties, and at nearly every mine assays show gold, silver, copper, lead and sometimes zinc. Much wolframite float has been found on the western slope of Thumb Butte, but it has never yet been found in place. On a whole, the ores found are concentrating, and one of the great needs of the district is the building of concentrating plants. Several good strikes have been made, but most of the properties, while they have lots of it, can only show ore up to $30 or $40 per ton, and this will not pay to ship. Several mining men of the district are now planning a cooperative plant which may be built this winter.

That the value of the ores of the Thumb Butte district was recognized years ago is shown by the evidences of smelting operations that must have been carried on long before the present inhabitants settled the country. Ruins of an old smelter on the east slope of Thumb Butte, and the vast amount of slag scattered about, tend to prove this. Where the ore that was smelted came from is not known, but it is supposed to have come from tunnels and shafts long since lost. Neither is it known who mined and smelted the ore. Indian tradition tells of the working of ores in that vicinity in the 16th century by Spanish explorers. Some think the work was that of the Aztecs. Whoever it was they must have had good ore to work it profitably with their method of mining and reduction, which was no doubt very crude.

There are several operators and prospectors now in the district, and every month sees the number a little larger. Some have done a good amount of work; some not so much. Among the better known properties are the Anderson-Sweeney, silver; Tinkum, silver-gold; Aldred-Snow, copper-gold; Clark & Adams, gold; Dougherty, copper-gold; Thumb Butte, copper-gold, and the Lowrey, copper-gold.

Some Cripple Creek Nuggets.

Cripple Creek has produced over $260,000,000 in gold. The state of Colorado has produced to date $450,000,000 in gold —hence Cripple Creek was responsible for more than one-half the gold won in the state of Colorado.

The average depth of shafts in the Cripple Creek district is about 600 ft. The deepest shaft is only a little over 1500 ft., and there are very few more than 1000 ft. deep. Cripple Creek production, therefore, has been made from very shallow workings.

Three railroads furnish transportation to the Cripple Creek district. The Colorado Midland runs a branch from Divide, on its main line, across Cripple Creek. The Short Line runs directly from Colorado Springs to Cripple Creek, and is a favorite line with the tourist travel on account of its wonderful engineering and the magnificent scenery it passes through. The Florence & Cripple Creek railroad is a narrow-gage road running into the district from Florence.

Since 1897 Cripple Creek has never failed to produce at least $1,000,000 in gold every month, except for a very short period during the strike.

In addition to these railroads, the district is served internally by the Midland Terminal railroad, which gives switching facilities to almost every mine in the district. Finally, the Golden Circle, an electric trolley line, gives an almost unrivaled service between Victor and Cripple Creek, and by means of its high and low lines enables almost every miner in the district to go to and from home to his work on the car.

The dumps of Cripple Creek aggregate about 30,000,000 tons, and they are being added to at the rate of about 2,000,000 tons a year. This material can be handled at a profit of nearly $1 a ton, as demonstrated by the Stratton's Independence and the new Portland mill. The dump material is treated by a modification of the cyanide process, which allows the values to be extracted without roasting.

For two and a half years a great drainage tunnel has been driven by the mine owners of the district. This tunnel has just commenced to give useful service. The El Paso will be the first mine drained. In a year practically all the mines of the district will be drained to a depth of 1300 to 2200 ft. below the surface. It is expected that at least 10,000 gals. of water a minute will pass through the tunnel during the next two years.

Normally, about 3000 men are employed in the mines.

Cripple Creek shows no signs of impoverishment with depth. The best ore of the El Paso was found on the 800-ft. level. The 9th level of the Elkton is known to have high-grade ore shoots. The 1100-ft. level of the Gold Coin, now under water, is known to have high-grade ore. At the 1300-ft. level of the Portland No. 1 shaft an ore shoot 800 ft. in length, of very high grade, was opened up. At the Golden Cycle the ore shoots in the 1200-ft. level are fully as large, and the grade of ore better, than in most of the levels above. On the 1200-ft. level of the Vindicator the ore is as good, and the shoots as large, as on any level above. At the Isabella some of the largest shoots ever found have been cut in the 9th, 10th and 11th levels. The ore was high grade. At the Findley mine the 11th and 15th levels also contain high-grade ore.

A total of 1,550,756 tons of iron ore was exported from Spain during the six months ending with June last, as compared with only 3,758,938 tons in the corresponding half of last year.

Hydrozinkite, the basic carbonate of zinc, is found chiefly in massive, fibrous, or earthy form.

The Difference Between a Prospect and a Mine.

By FRANCIS C. NICHOLAS.

There is at present no adequate classification of descriptive terms for designating varying conditions of a mining property. We have the word "prospect" and we have the word "mine," yet between these two there are no designations, and it requires some astuteness in the use of words to indicate the line of separation between mines and prospects.

In the general loose construction of the nomenclature relating to mineral property, the man who would defraud others in a mining transaction finds no danger of prosecution if he calls a prospect a mine. Yet, to do so, is a distinct misrepresentation of facts, and if the usage of the words mine and prospect were a little more clearly defined, one of the principal sources through which misleading statements in regard to mineral properties are permitted to find circulation, would be completely closed.

During the Nevada speculations, how many prospects were incorporated and sold to the public as mines? In Cobalt, and all through Canada, what hundreds of prospects there were which the public took eagerly, paying fancy prices for shares in prospectuses offering mines, which, in fact, were nothing but prospects, and in most cases very poor ones at that.

To establish a usage in a language would take years of effort, and probably the word "mine" will be used for a considerable period to designate any mineral property from which it is expected that metaliferous ores are to be obtained.

Webster defines a mine to be a pit or excavation in the earth, from which metallic ores or other mineral substances are taken; distinguished from pits from which stones only are taken, which are called quarries.

Accepting this definition as correct, any man who has a property from which he expects to take metaliferous ores, and who designates his expectations as a mine, is an unmitigated liar. All over the country we hear complaints from people who claim that they have been swindled in mining stocks, and it would seem that their complaints are, in many instances, based on good construction. I have examined hundreds of mining stock propositions, and I do not remember one which did not refer to the property, for which capital was sought, as a mine. If this evil were checked, and if a prospect was put before the public as it should be, for exactly what it is, then there would at least be no investments under misapprehension. It is my opinion that every prospectus which puts forward a prospect as a mine is fraudulent.

I would desire to distinguish and designate the difference between a prospect and a mine, as follows. Briefly, we might call a prospect that ground from which it is expected that metaliferous ores will be obtained, and a mine any piece of ground from which such material is being taken. Yet, such a definition could hardly be satisfactory, and if it were generally accepted any one having a prospect from which a few pounds of ore were being taken, could claim that his property was a mine, and sell stock accordingly. The misapplication of this definition shows how hard it is, under popular usage, to define the difference between a mine and a prospect; and, also, the need of a sufficiently clear and explicit set of terms to adequately designate the different forms of mineral deposits in their stages of development. The words "prospect" and "mine" admit of so many applications that their use can rarely be accurate and distinctive.

To provide a clearer mode of expression, these terms might conveniently be used: Prospect, proved prospect, mine, established mine. By way of definition, we might consider a prospect to be any piece of ground which has been staked out and recorded, from which the owners anticipate that mineral can be taken. The fact that the person finding the prospect thinks sufficiently well of the appearances to go to the expense of staking out a claim and obtaining its registry, is evidence that there is a prospect of obtaining results. On such facts a status of legal position can be established, which is sufficient to maintain a distinct condition and lawful right. How far a person owning and enjoying this legal right is justified in expanding the interpretation of what he owns by calling the prospect a mine, is a question which may admit of discussion. In the opinion of the writer, to call a prospect a mine is a fraud, and misrepresentation, when by so doing people are encouraged to buy stock in a property called a mine, when it is really nothing but a prospect.

A prospect becomes gradually better as development proceeds. Still it is not a mine until it is ready to produce ore in paying quantities. The work may have proceeded far enough to give reasonable assurance that the deposit being prospected is a strong ore development, and in this stage the property could justly be called a proved prospect, and any prospect may be so considered after it has been opened and developed sufficiently to show, with reasonable certainty, that mineral is obtainable in sufficient quantities to warrant equipment for extraction and treatment.

A mine can be reckoned as any property which has reached a proved prospect, and in which the first attempts at taking out the ore and extracting or selling it on a quantity basis, have to warrant a profit are being undertaken.

A property which has not reached this stage in its development, cannot meet the conditions of [illegible] "An opening in [illegible] should [illegible] taken [illegible] being taken [illegible] the first [illegible]

mencement, it cannot be called a mine. It is evident that all mines cannot be profitable, nor is it known whether a profit can be had until the ore has been tested, and the works for treatment thoroughly established; therefore, the natural classification, an established mine suggests itself as a means of expressing that condition of mining operations where the ore bodies have been shown to be extensive, and a successful method of treatment has been established. Such a property can certainly be designated an established mine.

It is because of the established mines that a belief has become current among people who do not understand mining, that a mine is a store of great wealth; hence the fraud of stating in public offerings of stock that the company seeking capital owns a mine, when in the majority of instances the property is nothing but a prospect.

Of the numerous mining propositions which are sent me by investors, asking an opinion, it is the exception to find a proposition based on more than a prospect, in the great majority of cases, the prospect is not even partially developed, and the company is confronted with a barrier in the lack of money, which effectually holds it from any chance of beginning mining operations, at least until the difficulty has been overcome. Yet, these propositions are put forward with glowing representations, and are called "mines."

A mine means a place where mineral is being taken from the ground and operations are being conducted on a scale from which profits are to be anticipated. Such is the regular and generally accepted definition. Hence, to offer a prospect and call it a mine, with the glowing description of the ore obtainable, is deceptive, and deception is fraud.

Mining is of such great importance to any country, that the abuse of nomenclature, leading people to put out money under impressions that they are obtaining a participation in a certain kind of property, when in reality they are securing nothing but a chance in a prospect, leads to serious harm.

Speculatively, the writer believes in prospects. The opportunities for profit are greater than they can ever be in a mine. The reason is natural. A prospect is a cheap property, the shares as they are usually capitalized are worth only a few cents each, while the shares of a mine are usually worth many dollars each; yet, every mine was once a prospect. Consequently, successful purchases of shares in prospects must result in [illegible] dollars in value for [illegible] a mine. It is [illegible] conditions, as undesirable, as is the fact that [illegible] are almost sure to result when stocks in prospects, with a low cost, are sold at [illegible] to [illegible] the actual worth [illegible] established or [illegible] before.

If it were required of [illegible]

mining stocks, that they state exactly what the shares really represent, and, though they have a property with indications that mineral exists and of which they think favorably to the highest expectations, that they offer such propositions only as prospects it would be reasonable to expect that those who buy shares in them will know what they are buying. If the work on the property has gone further, and the indications of mineralization have been followed, and developed to a point where permanency of formation and continuity of mineralization is clearly indicated, the proposition might be put forward, and urged on the attention of investors as a proved prospect, and those who buy shares will know what they were buying—a chance in a prospect where strength of mineralization and supplies of ore are clearly indicated, but with the profits from treatment and utilization not yet fully assured.

If the work has gone still further, and the proved prospect has been developed to a point where ore in sight by general inference, if not by actual measurement, indicates though it does not fully prove, that a profit can be had, either by a treatment, for which tests have been made, and for which arrangements have been undertaken, so that equipment can proceed with indications of success as soon as the necessary money has been raised; or, if connections and prospective contracts have been made for the shipment and sale of the better ore, and the concentrates, as soon as suitable arrangements are secured, the property might then be put forward as a mine, but with all the speculative features, and risks attending operation for equipment and adjustment to a point of an efficiency where a mine is making a profit. When that point is reached, a proposition may be offered as an established mine, that most desirable of all offerings in mining.

When a mine is advertised as an established property it should not only be opened, and the ore bodies proved, but it should also be equipped successfully, and be prepared for the profitable treatment of its ores, either by the production of bullion or the selling of ore and concentrates. There should also be reserves of ore equal at least to the selling price of the mine as represented by the price of a share multiplied by the total number of shares in the capitalization.

By general and common understanding a mine is a property from which valuable materials are to be had, not a property from which there is a prospect that valuable materials can be had. Therefore, when a prospect is offered as a mine, the fraud must be apparent

There is no question that shares in prospects, offered at a just price afford, when in honest hands, one of the most desirable forms of mining speculation, but it is fraud to offer them for something better than they really are. It is honorable, just and desirable to offer shares in a prospect, referring to the property in the prospectus for exactly what it is, a prospect, that is a mineral property held under location, or other title, where there are indications that by further development, ore bodies can be developed and the value of the property established or proved. Such stocks should be low priced. The trouble with offerings of this kind is that those who have the shares for sale wish to obtain for them more money than they are worth, and commit an act of fraud and deception where the property they offer is falsely designated.

When the ore bodies have been actually established and the property has become a proved prospect, asking a higher price for the shares is justified. Where the work has gone still further, and enough ore has been put in sight to warrant milling operations, or contracts for delivery to ore buyers, the assays and tests indicating a profit, the property may justly be offered as a mine and a still higher price may properly be asked for the shares. With further development, good bodies of ore blocked out, prospect work still uncovering ore, and the treatment established on a profitable basis, participation in the property may be offered as shares in an established mine, and a good round price may justly be asked.

The prospects and the mines are all right; and mining is a most desirable business, probably the most profitable of all callings. There is a trouble, however, in that too much deception is practiced, shares in prospects and shares in mines are by false representation generally sold for more than they are worth, but if the usage and nomenclature were so established that the terms used would accurately describe the stage of development in the proposition offered, sales of shares under false valuations would not be so easy, or if effected under a false use of terms, would involve so much risk of punishment that even intentionally dishonest mining promoters would hesitate to accept the risk. For these reasons the terms "prospect," "proved prospects," "mine" and "established mines" are suggested as providing a basis of exact designation.

It is probable, however, that this matter of establishing suitable nomenclature must develop gradually. One thing can be done, however, any person who considers the purchase of mining shares can, before placing his money, write and ask the promoter whether the stock is a "prospect," "proved prospect," "mine," or an "established mine." The reply to such an inquiry could not be other than a decided statement of facts, which would enable the inquirer to form an idea of the real condition of the property; or, if false answers were given, the misrepresentation would be so apparent that recovery for fraud would certainly hold if claims were lodged against the person who sold the mining stock under misrepresentation.

Gold received by the U. S. Assayer's office at Seattle this year up to Nov. 8, was $9,309,109 from Alaska, $1,036,296 from British Columbia, $97,021 from the Yukon and $61,994 from other sources in Canada

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The output of the mines and mineral works of Ontario for the year 1909, according to returns made to the Ontario Bureau of Mines, is valued at $32,981,375

Coal Mining Industry of India.

The principal mines of India, according to U. S. Consul-General W. H. Michael at Calcutta, are coal, gold, and manganese of iron, coal, which is largely confined to the Province of Bengal, being the most important. There are 129 coal companies interested in the development of these coal mines, which have a capital of not less than $28,900,000. All coal mines are able to reach Calcutta, the principal coal market of India, by railroads, which carry the coal to the docks of the city.

The output of coal in 1908-9 was 11,820,114 tons, of which 90% was mined in the Jherria field and most of the remainder in the Raniganj field, which formerly produced the larger part. Prior to 1860 coal was imported from England into India for all the purposes for which it was used. Now the home mines supply nearly all the needs of railways, cotton, jute, and other mills, foundry and machine shops, and domestic uses, as well as bunker coal.

Coal and coke were exported in 1909-10 to the amount of 758,828 tons, nearly all through the port of Calcutta, an increase of more than 32% over the amount exported last year.

The imports of coal in 1909-10 amounted to 428,535 tons, valued at $2,420,500. This was a decrease in quantity of 6% and in value of 11.7%, compared with last year. The United Kingdom supplied 301,509 tons, Australia 27,189, and Natal 71,367. The government imported 26,365 tons from England.

The price of first-class Jherria Bengal coal per ton on the cars in 1909-10 ran from 90 cts. to $1.25, the lowest level reached during the last four years. Less than half of the registered coal companies paid dividends, the year having been most unfavorable to shareholders, who two years ago, during the boom in coal stocks, borrowed money with which to buy coal shares. It is believed, however, that these investments will revive.

Nevada's Bullion Tax.—Nevada state bullion tax and license department has submitted its report for the second quarter to the governor. The report shows that for the second quarter the state received something over $73,000 from the bullion tax. This is at the rate of more than $300,000 a year. The gross output reported for the quarter approximates $8,000,000. Esmeralda ranked first in order of production, with an output of $3,222,254.14. White Pine was second, with an output of $2,154,151.40, and Nye county third, with $2,137,378.15.

The Alaska-Mexican Gold Mining Co. reports for the month ending October 15, as follows: Tons ore crushed, 18,516; tons sulphurets saved, 330. Estimated gross value of free gold, $33,643.13; of base bullion, $474.01; of sulphurets, $32,711.78; less amount due Alaska-United Co., $1765.76; estimated total production, $65,063.16; estimated realizable value, $62,746.73. Operating expenses, $27,472.80; net operating profit, $35,273.93; construction expenses, $7103.02. Yield per ton of ore milled, $3.51.

Proposed Rules for Use of Electricity in Mines.

A set of rules, of which the first installment follows, has been prepared by the National Bureau of Standards as a result of the work started in co-operation with a committee appointed by the American Mining Congress. These rules are recommended as a basis for the enactment of uniform legislation on electrical practice in mines by the various mining states. They are the result of a thorough investigation of past state and foreign legislation, together with a study of the conditions to be met.

DEFINITIONS.

The expression "pressure" means the difference of electrical potential between any two electrical conductors.

(a) Where the conditions of the system are such that the pressure between any two conductors, or between any conductor and the earth, at the terminals where the electricity is being used cannot exceed 300 volts, this shall be deemed a low-pressure system.

(b) Where the conditions of the system are such that the pressure between any two conductors, or between any conductor and the earth, at the terminals where the electricity is being used, can exceed 300 volts, but cannot exceed 600 volts, this shall be deemed a medium-pressure system.

(c) Where the conditions of the system are such that the pressure between any two conductors, or between any conductor and the earth, at the terminals where the electricity is being used can exceed 600 volts, this shall be deemed a high-pressure system.

SECTION 1.—GENERAL.

Rule 1.—All electrical apparatus and conductors shall be sufficient in size and capacity[1] for the work they may be called upon to do, and so installed, operated, maintained, and safeguarded as to reduce the danger from accidental shock or fire or overheating to the minimum, and shall be of such construction and so operated that the rise in temperature caused by ordinary working will not injure the insulating materials.

All metallic coverings or armoring of cables, and the frames and bed plates of generators, transformers, and motors, and the metallic coverings of switches, fuses, and circuit breakers, shall be efficiently grounded.[2]

Rule 2.—All alternating current systems in which the normal working pressure does not exceed the limits of medium pressure, and all 3-wire direct-current systems shall be grounded. Where practicable, the neutral shall be grounded.[3]

Rule 3.—A higher pressure than medium pressure shall not be used for portable apparatus, for current supplied to translating devices operated by persons working in contact with the ground, for transmission, or for application to alternating current apparatus in which the whole of the [illegible] is not effectively taken [illegible] at a pressure higher than a medium pressure, all transformers shall be of the oil-insulated type and a motor shall not be [illegible] than 50 brake horsepower.

All high and medium pressure [illegible] apparatus shall be examined at frequent intervals by the [illegible] together with [illegible] so as to indicate [illegible] danger as. All low pressure power or lighting wires shall be marked with the word "Caution," together with a statement of the voltage of the [illegible].

Rule 4.—The insulation of each circuit or section of circuit shall be measured at least once every 3 months, and a record of all such measurements shall be kept at the office of the mine. If the resistance measurements show that the leakage current in any section of a lead-covered cable, or any 2 or 3-wire cable, under normal conditions of operation, may exceed 1,000 of the maximum working current[4] for the given conductor, the defect shall be located and repaired at once. It shall be the duty of the mine foreman, or some other responsible official designated for the purpose, to see that the tests required are regularly made, and that a portable testing set be available for the purpose.

Rule 5.—At every mine where electricity is used below ground, a competent mine electrician and, where necessary, an assistant mine electrician also, shall be employed, subject to the authority of the mine foreman or other responsible official. No mine shall be permitted to operate without an electrician for [illegible] minimum period exceeding 30 days unless a written permit to so operate shall be obtained from the department of mines. The electrician shall have full charge of all electrical apparatus used in connection with the mine.

After the expiration of [illegible] months from the passage of this act no person shall be permitted to act as a mine electrician unless he shall be the holder of a certificate of competency issued by the department of mines.

Any person appointed to operate any electrical apparatus in connection with a mine shall be instructed in his duty by the mine foreman or electrician before taking charge of the apparatus.

Rule 6.—Fire buckets filled with clean, dry sand shall be kept at the mines where electrical apparatus is located, [illegible] accessible.

Rule 7.—Instructions shall be placed at the [illegible] and in every generating [illegible] and every house for the resuscitation of persons suffering from electric shock. All employees operating the electrical apparatus shall be required to acquaint themselves with these instructions.

Every personal accident occurring in connection with the operation of the electrical equipment shall be promptly reported by the person injured, or by some other person on his behalf, to the mine foreman, and shall be recorded by him at the office of the mine.

Rule 8.—A plan on a scale not smaller than 200 ft. to the inch shall be kept at the mine, showing the position of all permanent electrical machinery and fixed cables or conductors in the mine, and shall be corrected as often as may be necessary to keep it as nearly as practicable up to date, and never more than 6 months in arrears.

Rule 9.—Any person who shall wilfully tamper with, or make any unauthorized changes in, or connections to, any part of the electrical circuits or apparatus in, or used in connection with a mine, whether such circuits are alive or not, or who shall wilfully cause any other person to come in contact with any live electrical circuits, shall be deemed guilty of a misdemeanor.

Rule 10. In any bituminous coal mine where the special rules applying to gaseous mines are not observed, precautions, such as sprinkling or other effective means, must be taken to prevent dangerous accumulation of coal dust.[5]

SECTION 2.—TRANSMISSION [illegible] AND CABLES.

Rule [illegible].—Where the generating station, under the control of the owner or superintendent of the mine is not within 1000 ft. of the mine entrance, a switch box or boxes efficiently inclosed, or a switch house, shall be provided near the mine entrance for cutting off the supply of electricity to the mine. In all mines the power for electric hoists which are regularly used for lifting miners from the workings, and in all coal mines the power for fans, must be supplied by separate feeders run from any convenient distributing point, so that power may be kept on either or both of these circuits when all other circuits in the mine are cut off.

Rule 12.—All terminals and live metal on machines over low pressure, below ground, shall, where practicable, be protected with insulating tape or other suitable insulating covers, or with metal covers connected to earth.

Rule 13.—If the transmission lines from the generating station, or substation, to the mine entrance are overhead, they shall be properly secured to insulators and have lightning arresters at the mine entrance, if the overhead line exceeds 400 ft. in length.

In the case of high [illegible] wires, they shall be maintained at least 20 ft. from the ground, except where they enter the

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[1]The table of carrying capacity [illegible] National Electric Code should be [illegible] where practicable. It can be secured by addressing C. M. Goddard, [illegible] derwriters' National Electric Association, 141 Milk street, Boston.

Note:—The notes to which [illegible] made in this article will be published in a separate article next week.

[2]See Note A.

[3]See Note B.

[4]See Note F.

mine or transformer station, in which case they shall be adequately protected. All medium and low-voltage wires shall be maintained at least 6½ ft. above the ground at the lowest point, except where they enter the mine.

Rule 14.—All high-pressure wires in underground roadways shall be in the form of lead-covered cables, which may be either armored or unarmored. The insulation of these cables must be non-hygroscopic and as nearly acid proof as possible, so that a defect in the lead sheath will not give rise to an immediate breakdown of the insulation.[10]

In non-gaseous sections of mines, medium or low-pressure wires may be bare. If insulated, they must be covered with high-class insulation that is as nearly moisture and acid proof as possible. All high and medium-pressure wires, unless metal covered, must be adequately protected where there is danger of men or animals coming into contact with them.

Rule 15.—The exposed ends of cables where they enter the terminals of switches, fuses, and other appliances shall be properly protected and finished off so that moisture cannot creep along the insulating material, or so that the insulating material, if of an oily nature, cannot leak out of the cable.

Rule 16.—All joints must be electrically efficient, mechanically strong, and where practicable should be soldered. All joints, except in trolley wires, should be taped or otherwise suitably insulated to protect them from corrosion.[11]

Rule 17.—All cables used in shafts must be highly insulated and substantially fixed. Shaft cables not capable of sustaining their own weight shall be properly supported at intervals, according to the weight of the cable. Where the cables are not completely boxed in and protected from falling material, space shall be left between them and the side of the shaft, so that they may yield when struck, and thus lessen the blow given by the falling material.

Rule 18.—Where the cables in main haulage roads, where persons are hauled into or out of the mines, cannot be kept at least 18 ins. from any part of the car, they shall be specially protected.

Cables and wires, unless provided with metallic coverings, shall not be fixed to walls or timbers by means of non-insulating fastenings.

Metal covered or any multiple conductor cables underground, when suspended, shall be supported flexibly in such a manner as to give at their readily breakage away when struck before the cables themselves can be seriously damaged.

Where tamping or other roads are being repaired, or where blasting is being done, temporary protection must be used, so that the cables are protected from damage.

Rule 19.—Trailing cables for portable motors shall be especially flexible, properly insulated, and protected with extra tough braiding, or other equally effective covering.

[10]See Note G;
[11]See Note H.

Rule 20.—The twin trailing cables, supplying power to coal-cutter motors, shall be divided at the motors, but only for such a length as is necessary for making the connection to the motor, and the twin cable, with its outer covering complete, shall be securely held by a suitable clamp on the frame of the motor, in such a manner as to protect the trailing cable from injury, and to prevent any mechanical strain being borne by the terminals making electrical connection with the motor.

Rule 21.—In the event of the trailing cable in service breaking down or being damaged, or of its inflicting a shock upon any person, it shall at once be put out of service, and shall not be used again until it has been repaired and tested by the mine electrician or assistant mine electrician.

The trailing cable shall be kept disconnected from the machine while it is being loaded upon or unloaded from the truck, unless electric power is necessary for such loading or unloading.

Rule 22.—In underground roads, the trolley wires shall be placed as close to the side as practicable, and in a straight line, and securely supported at frequent intervals. In all roads where it is necessary for men to travel on foot, all wires, except signal wires, must be placed on the same side of the roadway. Signal wires should, where practicable, be placed on the opposite side of the roadway from other wires.

At all landings, turn-outs, partings, or crossings, or other places where it is necessary for men to pass near the wires, a suitable protection shall be placed around the wires, or the pressure must be cut off when such places are used for traveling on foot. Sufficient illumination shall be provided at all points where men are liable to come in contact with power wires.

Every branch trolley shall be fitted with an automatic trolley switch, or section insulator and line switch, or some other device than will allow the pressure to be cut off from such trolley when not actually in use.[12] Danger signals, consisting of no fewer than two red lights in parallel, and as many in series as may be necessary, shall be connected at suitable intervals to all branch trolley circuits to indicate when the current is on. A notice shall be posted at the entrance to all roadways carrying exposed power wires, warning persons against the dangers of carelessly carrying metal tools such as drills, picks, etc., which may come in contact with the wires.

Rule 23.—Small wires for lighting or signal circuits shall either be conveyed in pipes or casings, or they may be suspended from porcelain or glass insulators or securely tied to them, so that they do not touch any timbering, coal, or metal. On no account shall staples be used. If metallic pipes are used, they must be grounded, and if not electrically continuous, every section must be grounded. If separate insulated wires are used, they shall be kept at least 3 ins. apart, and not

[12]See Note I.

brought together, except at lamps or fittings.

SECTION 3.—SWITCHES, FUSES, AND CIRCUIT BREAKERS.

Rule 24.—Fuses and automatic circuit breakers should be so constructed or adjusted as to open the circuit when the current through them exceeds, by 100%, the working current in the case of motors, or the permissible current of the cables which they protect. Fuses shall be stamped or marked, or shall have a label attached indicating the current at which they are intended to fuse, or, where fuse wire is used, each coil shall be so stamped and labeled. Fuses shall be adjusted or replaced only by a competent person, authorized by the mine foreman.

Rule 25.—All switches, circuit breakers, and fuses must have bases of marble, slate, or porcelain, or other suitable incombustible material, free from metallic veins, and shall be placed in as dry a situation as practicable.

Rule 26.—Wherever branch electric circuits have a main or secondary feeder, switches shall be provided for disconnecting the branch line from the supply line, and all main and distributing feeders shall be provided with sectionalizing switches at distances not exceeding one mile.[13]

All circuits that are to be made or broken underground shall be fitted with proper switches. If connection is made to the supply line by means of hooks or other temporary connections, the switch must be open when such connection is made or broken.

SECTION 4.—MOTORS.

Rule 27.—Every underground motor, together with its starting resistance, shall be protected by a fuse or circuit-breaking device, in accordance with rule 23, and by switches capable of entirely cutting off the pressure. The switches shall be placed in a convenient position near the motor.

Rule 28.—Where unarmored cables or wires pass through metal frames or into boxes or motor casings, the holes shall, where practicable, be substantially bushed with insulating collars.

Rule 29.—No person shall be permitted to take charge of an electric coal-cutting machine in a mine who is not a competent person, capable of determining the safety of the roof and sides and of detecting the presence of explosive gas.

In order that the roof may be carefully examined, a coal-cutter motor shall not be kept continuously in operation for a length of time exceeding half an hour, unless otherwise specified in writing by the mine foreman.

Rule 30.—The person in charge of a coal-cutting or drilling machine shall not leave the machine while it is working, and shall see that the pressure is cut off from the trailing cables before leaving the working place.

Rule 31.—Electricity from light and power circuits shall not be used for firing shots in a mine except where the electrical connection to such light or power circuit

[13]See Note J.

is made within an inclosed switch which shall be kept securely locked and shall be accessible only to the authorized shot firer. If electricity from light or power cables is used for firing shots in a mine, no shots shall be fired until all the men are out of the mine.

Special precautions must be taken to prevent accidental contact between shot-firing cables or wires and power and lighting cables.

Only persons authorized in writing by the mine foreman or superintendent are permitted to fire shots electrically in a mine.

Rule 32.—All apparatus used for firing shots electrically shall be of a type approved by the inspector for the conditions under which it is to be used.

Rule 33.—Where battery or magneto exploders are used, they shall be inclosed in a suitably constructed box fitted with a removable connecting plug or key without which the circuit can not be closed. This plug or key shall be detached when not required for firing and shall not under any conditions pass from the personal custody of the shot firer while on duty. Exploders shall be frequently tested by shot firer to insure that they give the necessary pressure and current.

The exploder shall not be connected to the shot-firing cable until all other steps preparatory to the firing of the shot have been completed and all persons have removed to a place of safety.

Immediately after the firing of the shot, the firing cable shall be disconnected from the exploder, and no persons shall approach a shot that has been attempted to be fired by electricity and has failed to explode until the firing cable has been so disconnected and an interval of 5 minutes has elapsed since the last attempt to fire the shot.

Rule 34.—All proper precautions shall be taken to prevent electric wires from coming in contact with other electrical conductors, whether insulated or not.

Bells, wires, insulators, contact makers, and other apparatus used for electrical signaling in connection with the working of a mine shall be of substantial and reliable construction, and shall be erected in such a manner as to reduce the liability to failures or false signals to the minimum.

Rule 35.—All coal mines from which exit is by shaft only, and all others in which the working places extend more than 1 mile from a place of exit, shall be provided with telephone systems, provided the number of men employed at any one time on the regular working force exceeds 25.[1] The system shall be of approved construction, and of such extent that no working place shall be at a greater distance than ½ mile from a telephone, and all places where there are permanent attendants shall be provided with telephones. If more than two men are employed at any one time on the regular working force inside the mine, the telephone lines shall, if possible, be introduced through drill holes so that falls of earth and explosions will be less likely to interrupt the working of the telephone system. All main telephone [illegible] insulators, with water-proof insulation [illegible] run through metal pipes or conduits [illegible] protected by a water-tight [illegible]

[illegible]

Rule 37.—In any mine which generates an appreciable quantity of explosive gas and in which electricity is employed below ground, every working place shall be examined each time gas is gathered fire boss before any men are permitted to go to work in the mine, and if explosive gas is found in any part of the mine in sufficient quantities to permit its detection by an approved type of safety lamp, the test being made under normal conditions of ventilation no electrical pressure shall be permitted on any circuits for a period of 24 hours in that part of the mine in which gas is found or in any other part of the mine in the return air course from said gas or in part.

Rule 37.—If any mine generates a sufficient quantity of explosive gas to render necessary the use of locked safety lamps in any part or parts of the mine, those parts of the mine in which locked safety lamps are necessary shall be subject to the following rules in addition to those provided for other mines.

Rule 38.—In any part of a mine in which locked safety lamps are necessary, if, for any reason, the normal ventilation is stopped for a period exceeding 15 minutes, the pressure shall be switched off from all direct-current motors in the same air course, which are not provided with explosion proof casings, except such motors as may be used for driving the ventilating fans or removing men from the mine, and the pressure shall not again be switched on until normal ventilation has been resumed and tests have been made to show that the mine is free from gas.

Rule 39.—No pressure higher than a medium pressure shall be used, and no bare wires other than signal wires shall be permitted.

Rule 40.—The mine electrician or assistant mine electrician shall be on duty in the mine at all times when the electric power being used for the production of coal in a gaseous part of a mine exceeds 25 hp.

Rule 41.—Many cables shall be taken [illegible] the intake [illegible] for the purpose, and [illegible] free from explosive gas.

[illegible] shall be [illegible] the machine [illegible] other [illegible]

The machine man shall also be required [illegible] the trailing cable [illegible] defects, [illegible] becoming [illegible] The [illegible] assist [illegible]

[illegible] failure [illegible] other [illegible] cutting [illegible] or [illegible] gas or [illegible]

breakers, and fuses, shall be inclosed in explosion proof boxes or break under oil.

Rule 41.—Where the insulation of a motor is found to become damp during a stoppage, suitable steps shall be taken to insure that the insulation shall be dry before the working of the motor is resumed.

Rule 45.—All direct-current motors, unless placed in rooms separately ventilated by intake air, shall have all their current-carrying parts, switches, starters, terminals, fuses, and connections completely inclosed in explosion proof castings, which shall be of sufficient strength to resist the force of an internal explosion, and which shall be provided with special outlets so designed that the escaping gases shall be cooled to such an extent that they can not communicate the explosion to the outer atmosphere. Such inclosures shall not be opened except by an authorized person, and then only when the pressure is switched off. The pressure shall not be switched on or off while the inclosures are open. All alternating current motors shall be operated with inclosed, oil-break switches.

Rule 42.—A safety lamp or other suitable apparatus for the detection of explosive gas shall be provided for the use of the attendant of all electrical apparatus underground, and should any indication of explosive gas appear on the flame of the lamp, or other apparatus used, the person in charge shall immediately stop the machine, cut off the pressure at the nearest switch, and report the matter to the mine foreman, who shall see that, as soon as practicable, the pressure shall be cut off from the wires or cables leading to that part of the mine. The pressure shall not again be switched on until at least 24 hours have elapsed since the last appearance of gas.

Rule 43.—Before an electric coal cutting machine is brought within 20 yds. of the working face in a gaseous part of a mine, the machine man shall make an inspection for gas in the place where the machine is to work, unless such examination is then made by some other competent person authorized or appointed for that purpose by the mine foreman. If any explosive gas is found in the place, the machine shall not enter there.

No coal-cutting machine shall be continued in operation for a longer period than half an hour, unless otherwise specified in writing by the mine foreman, without a further test being made for gas, as described above, and if gas is found, the current shall be switched off the machine at once, and the trailing cable shall forthwith be disconnected from the feed wire.

The person finding gas shall [illegible] a danger signal [illegible] against entering the place. [illegible] cable shall be removed from such place, and shall not be brought back, nor shall the machine be again started until the mine foreman or a person duly authorized by the mine foreman has examined it and has pronounced it free from gas and has removed the danger board.

[1]See Note M.

The person finding gas shall forthwith report the same to the mine foreman, and at the end of the shift he shall make and sign a written report in a book kept at the mine for the purpose.

Rule 48.—If any sparks or arcs appear outside the casing of any inclosed motor, or about the cables or rails, the machine shall be stopped, and shall not be worked again until the defect has been repaired, and the occurrence shall be reported to the mine foreman or assistant mine foreman.

Rule 49.—All inclosed motors used underground shall be opened and inspected at least once a week by the mine electrician or his assistant, and, where necessary, shall then be cleaned and repaired. Inclosed switches shall be opened and inspected at least once every month.

Rule 50.—Electric haulage on the trolley-wire system shall not be allowed in any part of a mine where locked safety lamps are necessary. If storage battery locomotives are used in such places, the rules applying to motors shall also be deemed to apply to the boxes containing the cells.

Rule 51.—In any part of a mine where there is danger of igniting gas or coal dust, electric lamps, if installed, must be of the inclosed vacuum type, and they shall be inclosed by gas-tight fittings of strong glass and shall have no flexible cord connections. Electric lamps shall be replaced only by an authorized person.

In all machine rooms and other places in gaseous mines where the failure of electric light is likely to cause danger, some safety lamps or other proper lights, not fewer than the number to be prescribed for such place by the inspector, shall be kept for use in the event of such failure.

Rule 52.—Wherever safety lamps are to be lighted underground by electricity, the mine foreman shall select a suitable station or stations not in the return airway, and where there is not likely to be any accumulation of explosive gas, and no electric relighting apparatus shall be used in any other place. All electric relighting apparatus shall be securely locked, and shall not be available for use except by persons authorized by the mine foreman to relight safety lamps, and such persons shall examine all safety lamps brought for relighting before they are reissued.

Rule 53.—In any part of a mine where safety lamps are necessary the pressure used for signaling shall not exceed 50 volts, and bare wires shall not be used for such purposes except in haulage roads.

Rule 54.—All conductors shall have a rated carrying capacity in accordance with the requirements of the National Electric Code.

SECTION 6.—THE INSPECTION OF ELECTRICAL EQUIPMENT OF MINES.

The governor shall appoint, within 3 months after the passage of this act, three (3) citizens of this Commonwealth of good repute, to be known as the Examining Board for Electrical Mine Inspectors and Mine Electricians, whose duty it shall be to examine applicants for the office of electrical inspector of mines of this Commonwealth and to examine persons who desire to receive certificates of competency as mine electricians. The chief of the department of mines shall be ex officio chairman of this Board, and the other two members shall be, one a mine superintendent, and one an electrical engineer. They shall be at least 30 years of age, and shall have had at least 5 years' experience in the practice of their respective professions. The chairman of this board shall receive no other compensation than his salary as chief of the department of mines. The other two members of the Examining Board shall each receive the sum of $10 a day for each day actually employed in discharging their duties according to the provisions of this act and all necessary expenses incurred in performing the duties imposed upon them by this act. Any vacancy that may occur in the membership of the Examining Board shall be filled by the governor according to the provisions of this act.

The Board after being duly organized shall, before proceeding with its duties, go before any proper officer authorized to administer oaths and each member shall be duly sworn to faithfully perform the duties of his office without fear or favor.

The oaths of the members of the Examining Board shall be kept on file in the office of the department of mines as public documents.[17]

The Examining Board shall be convened by the chief of the department of mines at such time as circumstances may require, for the purpose of examining applicants for the office of electrical inspector of mines, or for preparing questions and formulating rules for conducting examinations, or for performing any other duties made necessary by the provisions of this act. The Examining Board shall also meet regularly once each year, and oftener if necessary, for the purpose of examining applicants for the certificate of competency as mine electrician.

Every examination shall be publicly advertised throughout the mining district for a period of at least thirty (30) days prior to the date of the examination, and the time and place of the examination and the conditions of eligibility shall be fully stated in the advertisement.

All applicants for appointment to the position of electrical inspector of mines shall certify to the Examining Board that they are citizens of the state of . . . . . ; that they are not pecuniarily interested in any of the mines of the state; that they are men of personal integrity, of temperate habits, and of good repute; that they are in good physical condition; and that they are between the ages of 30 and 45 years. Provided, however, that any person who has served as electrical inspector under this act before reaching the age of 45 years shall be eligible to reappointment at the discretion of the Examining Board.

Applicants must further show that they have had at least 5 years of practical experience in the operation of electrical apparatus devoted to power purposes, at least 2 years of which must have been in connection with the electrical equipment of mines.

The examination shall be in writing and shall be of such a nature as to show that the applicant possesses sufficient theoretical and general practical knowledge of the application of electricity to mining, of the dangers attending its use, and the safeguards that should be employed. Each applicant must also show that he possesses a full knowledge of the code of the Underwriter's National Electrical Association, of the rules of the American Institute of Electrical Engineers, and of the rules governing the use of electricity in mines as prescribed in this act.

The Examining Board shall grade each applicant according to his merit. In determining the grade, the previous experience and record of service of the applicant together shall have equal weight with the written examination, and only those who receive a grade as high or higher than that previously determined upon by the board shall be eligible to appointment. The examination sheets of all applicants, together with the complete list of questions and their correct solutions, shall be kept on file in the office of the department of mines as public documents. The Examining Board shall certify to the governor and to the department of mines the name and grade of all successful candidates and shall issue to every candidate a statement of the result of his examination.

The governor shall, from the names certified to him by the Examining Board, commission as many electrical inspectors as the conditions of the service may require, but at least one electrical inspector must be appointed for each five inspection districts of the state. Provided, that if in any district the regular inspector of mines is also a qualified electrical inspector, such district need not be counted in determining the number of electrical inspectors necessary. When appointments are made, those persons standing highest in percentage on the examination shall be given preference over those of lower percentage. Provided, that any person who has not been certified as hereinabove provided within a period of ten years, shall not be deemed eligible for appointment or reappointment to the office of electrical inspector of mines until he shall have been again examined and certified by the Examining Board according to the foregoing provisions of this act.

All appointments to the office of electrical inspector of mines shall be for a full term of 6 years, but in case of a vacancy the governor may commission for the unexpired term the person having the highest grade on the certified list.

Electrical inspectors on first appointment shall receive a salary of $3000 per year, which shall be increased to $3500 per year after the inspector has served

[17] The following form of oath is suggested: We, the undersigned, do solemnly swear (or affirm) that we will perform, to the best of our ability, the duties of examiner of applicants for appointment to the office of electrical inspector of mines, and of persons desiring to secure certificates of competency as mine electricians, and that in making such appointments we will be governed solely by the evidence of their fitness to perform the duties of electrical inspector of mines and of mine electrician, in each respective classes, as imposed by law, and that we will refuse to certify all who fail to show proper evidence of their fitness for such duties.

for 6 years. Each electrical inspector may incur traveling expenses and such other expenses as may be necessary for the proper discharge of his duties under this act, which shall be paid quarterly by state treasurer on warrant of state auditor issued upon presentation of vouchers sworn to by the inspector and approved by the chief of the department of mines.

The electrical inspector shall inspect the electrical equipment used in, or in connection with, all of the mines within his jurisdiction as often as possible. Within 5 days after completing the inspection of a mine, the inspector shall prepare a printed report setting forth fully the condition of the electrical equipment of said mine, the copy of this report shall be sent to the office of the department of mines, where it shall be kept on file as a public document, and another copy shall be sent immediately to the superintendent of the mine to be posted by him in a conspicuous place near the workings.

If the inspector discovers any violation of any of the provisions of this act, or any conditions which, in his opinion, may be contrary to the spirit of this act, he shall at once notify the superintendent or manager of the mine in which such condition is discovered and order the immediate removal of the defect. If the superintendent or manager fails to remove at once such condition,[19] the inspector shall immediately report the matter to the chief of the department of mines, who shall promptly designate two other inspectors who shall accompany said electrical inspector to the mine wherein said dangerous condition is alleged to exist. If after a full investigation the inspectors agree that the condition is one of grave danger, they shall direct the superintendent of the mine in writing to remove the dangerous condition immediately, and if the superintendent fails to do so, the inspectors shall at once apply to the proper court for a writ of injunction to enjoin the immediate suspension of all work in or about any part of the mine which the inspectors believe to be jeopardized by the dangerous condition. Whereupon the court shall proceed immediately to hear the case, and if the cause appear to be sufficient he shall issue a writ of injunction restraining the working of said mine until it can be shown to the satisfaction of the court that the provisions of this act have been complied with.

If the court shall sustain the decision of the inspectors, the costs of the proceeding shall be paid by the owner or agent operating the mine, but if the court shall not sustain the decision of the inspectors, the costs shall be paid by the county.

The electrical inspector shall work under the direction of the chief of the department of mines and shall perform such duties and make such reports from time to time as he may direct.

If at any time the electrical inspector shall discover any condition of so grave a character that, in his opinion, any delay might be disastrous to life, he shall have the power to withdraw temporarily all persons from such dangerous place until the foregoing provisions of this section can be carried out.

The electrical inspector shall have the right to enter any mine within his jurisdiction at any time for the purpose of making examinations or obtaining information. In case of accident, resulting directly or indirectly from the use of electrical apparatus in or about the mine, the electrical inspector shall be required to make a full and complete investigation into the nature and cause of the accident, and to enable him to do this he shall have power to summon witnesses and administer oaths. He shall make a full report of every such investigation to the chief of the department of mines.

When written charges of incompetency or gross neglect of duty or malfeasance in office, shall be brought against any electrical inspector, and signed by not less than 15 coal miners, or by one or more mine owners or operators and accompanied by a bond in the sum of $500, payable to the state and signed by two or more responsible freeholders, and conditioned for the payment of all costs and expenses arising from the investigation of such charges, the governor shall convene a board of examiners to investigate the case, which board shall consist of three members, one of whom shall be a member of the electrical inspectors' examining board, one a mining engineer, and the third the attorney general of the state or a presiding judge of the district court, said board to be convened at such time and place as the governor may deem best, giving 10 days' notice to the inspector against whom the charges are made, and also the persons, who have made the charges. The board when so convened, and having been first duly sworn to hear the charges fairly, shall have power to issue subpoenas for witnesses desired by either party to the case and examine them on oath which may be administered by any member of the board, and depositions may be read in such examination in the case of absent witnesses; and the board shall proceed to hear the charges and report the result of their examination to the governor. If the board shall sustain the charges made, the governor shall at once declare the position held by the said electrical inspector vacant and shall proceed to fill the vacancy in accordance with the provisions of this act, and the costs of said investigation shall be paid by the county. If, however, the charges shall not be sustained, the said electrical inspector shall stand exonerated, and the costs of the examination shall be paid by the persons signing the bond.

Applicants for the mine electricians' certificate of competency shall be required to give satisfactory evidence that they are at least 21 years of age, that they are of temperate habits and of good repute, and that they are in good physical condition. They must further show that they have had at least 2 years' practical experience either as assistant mine electrician or in the operation of electrical systems devoted to power purposes, in which case their experience must include both wiring and the operation and repair of electric motors. They must give evidence that they possess a practical knowledge of electric wiring, the making of joints, bonding of tracks, and testing for faults in wires, cables, and motors. Also, that they have a due appreciation of the dangers attendant upon the use of electricity in mines, and a knowledge of the proper safeguards. They must show also that they possess a sufficient knowledge of the rules of the American Institute of Electrical Engineers, and of the rules and regulations provided by law for governing the use of electricity in mines in the state of .

It shall be the duty of the mine superintendent, mine foreman, or other official in responsible charge of the mine at the time of any serious accident, at once to give notice of such accident to the inspector of the district in which the accident occurred.

Any person who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding $100, or by imprisonment for a term not exceeding 3 months, or by both such fine and imprisonment, at the discretion of the court.

Any mine owner, superintendent, mine foreman or mine electrician who shall wilfully permit any violation of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding $200, or by imprisonment for a term not exceeding 6 months, or by both such fine and imprisonment, at the discretion of the court.

If any employé shall recover any money occasioned by the violation of any of the provisions of this act by the owners or orders of said owners or operators, a right of action shall accrue to the employé against said owner or operator, for [illegible] Any [illegible] shall not be a bar to any [illegible] shall accrue to the widow or heirs at law of the deceased for the recovery of damages.

[illegible]

The term "ore in sight," while a misnomer, has a definite meaning, which is, perhaps, better expressed by the term "ore blocked out."

Leadhillite is a sulphate lead carbonate too rare to possess any commercial value.

[19] In some of the more important coal mining states the responsibilities of the electrical inspector of mines are so great that the salaries here suggested appear to be very moderate. In other states, as, for example, in the metal mining states or those states in which the coal mining industry is of great magnitude, a smaller board would be indicated.

[20] In a proposed code recently prepared by the Department of Mines of Pennsylvania and presented to the state legislature, the procedure is briefly as follows:

In case of disagreement between operator and mine owner or operator, the owner or operator shall appeal to the chief of the department of mines, who shall appoint two other inspectors to accompany the inspector to the district in order to make a further examination into the matter at issue. If the inspectors agree their decision shall be final unless the owner or operator shall appeal within 7 days to the proper county court, which court must then appoint three persons to referees to investigate the matter and if they sustain the decision of the inspectors their decision shall be final unless an exception is filed by the owner or operator within 10 days, in which case the court shall proceed at once to hear the case and the decision shall be final and conclusive.

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Failure of the Yuba Debris Barrier. H. H. Wadsworth. Abstract of paper to be presented to the Amer. Soc. of Civil Engrs. Describes the manner of construction of this dam or barrier, on the Yuba river, Cal., and discusses the causes responsible for its failure.—M. & S. P., Nov. 12, 1910; pp. 4; illus. 20 cts.

Iron Mining and Smelting in California. Al. H. Martin. Treats of the introduction and improvement of electric-furnace operations in Shasta county, and gives notes on the Minaret and Eagle mountain iron-ore deposits.—Mg. Sc., Nov. 10, 1910; pp. 2; illus. 20 cts.

The Baguio Mineral District. Frank T. Eddingfield. Gives notes on the mineral occurrences and production, the mines and mining operations, and labor conditions in this district.—Philip. Monthly, Sept., 1910; pp. 4; illus. 30 cts.

Copper Deposits of Northern Yuma County—I. Edwin Higgins. Treats of the geology and deposits of copper ores, and of the mining developments in the northern part of Yuma county, Arizona. —The Mining World, Nov. 5, 1910; pp. 2¾; illus.

New Furnace B-Detroit Iron & Steel Co. Gives particulars of the recently completed extensions of the plant of this company, its arrangement, ore-handling plant, blowing engines, etc.—Ir. Tr. Rev., Nov. 17, 1910; pp. 2½; illus. 20 cts.

Loss of Power in a Gas Engine Due to Elevation Above Sea Level. Ralph Wolfenden. Gives results of an investigation into the effect of altitude on the power developed by a gas engine.—Eng. Rev., Nov., 1910; pp. 2½. 25 cts.

The Great Power Plant at Electra. Archie Rice. Gives an illustrated account of the Electra hydro-electric power development of the Pacific Gas & Electric Co., in California.—Jnl. of Elect. P. & Gas, Nov. 12, 1910; pp. 7¼; illus. 20 cts.

Transportation of Coal in Mines. G. M. Gates. Paper read before the W. Va. [illegible] Inst., comparing animal and mechanical haulage in coal mines. The Mining World, Nov. 5, 1910; pp. 1 1-6.

Factors to Be Considered in Valuing a Water Power. Discusses the [illegible] principal [illegible] [illegible] Green & Co., [illegible] [illegible] any water power.—Eng. Rec., Nov. 19, 1910; 1100 words.

Design and Location of Sewers. Morton [illegible] before the H. Dist. [illegible] statement of the fundamental principles to be followed in properly laying out a piping system and a discussion of the materials which should be used to conform to good practice.—P. & E., Nov. 15, 1910; pp. 3½; illus. 15 cts.

Starkville Mine Explosion. W. W. Evans. Gives an account of the explosion at the No. 2 mine, at Starkville, near Trinidad, Colo., its cause and effects. —Colo. Sch. of Mines Mag., Nov., 1910; pp. 5½; illus. 35 cts.

Engineering Method Applied to Coal Mining. Warren R. Roberts. Abstract of paper read before the West. Soc. of Engrs., showing in what ways engineering enters into the making, equipping of a modern coal mine and mining plant.—The Mining World, Nov. 12, 1910; pp. 2⅔.

The Case Hardening and Heat Treatment of Low Carbon Steels. A. C. Sladky and A. F. Schultz. First part of abstract of thesis on this subject.—Wis. Engr., Nov., 1910; pp. 7; illus. 30 cts.

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An Electric Automatic Coal Railway. Frank C. Perkins. Treats of an electrically driven automatic transportation equipment recently placed in operation at Blossburg, Pa.—The Mining World, Nov. 5, 1910; 400 words; illus.

Interesting Achievements on the New Zealand Railways. W. Wilson. Gives a brief description of the methods by which some of the natural obstacles to railway construction in New Zealand have been overcome.—Aust. Mg. & Eng. Rev., Oct. 5, 1910; pp. 4¾; illus. 25 cts.

Mineral Wealth of Western Australia. Part I. A. Gibb Maitland. Gives notes on the mineral occurrences and statistics on the mineral production of the different districts of Western Australia.—Aust. Mg. & Eng. Rev., Oct. 5, 1910; pp. 12¼; illus. 25 cts.

Small Hoisting Shafts for Western Metal Mines. Arthur O. Gates. Gives factors to be considered in the construction of small 2-compartment shafts.—S. L. Mg. Rev., Nov. 15, 1910; pp. 2; illus. 25 cts.

Portland Canal Mining District, British Columbia. Newton W. Emmons. First installment of special report on the Portland Canal district, its history, geology, mines and mineral conditions.—The Mining World, Nov. 12, 1910; pp. 4⅜; illus.

Smoke Prevention. H. M. Nicholls. Gives a solution of the problem of smoke abatement for heating furnaces in iron and steel-working plants.—Ir. Age, Nov. 17, 1910; pp. 1½; illus. 30 cts.

Coal Washing vs. Picking. Discusses the relative values of the washing and picking methods for cleaning coal.—Ir & C. Tr. Rev., Nov. 1, 1910; pp. 2¼; illus. 25 cts.

Lead Mining in Scotland. Gives a review of the lead mines and lead mining in Scotland.—Eng., Nov. 4, 1910; 1900 words. 25 cts.

The Use of Cement and Its Substitutions. Ernest McCullough. Calls attention to the difficulties sometimes experienced in following specifications in construction work, owing to inability to get materials called for, and treats of the use of substitutes for Portland cement that may be used in the construction of cement concrete and the manner of using them.—The Mining World, Nov. 12, 1910; pp. 1½.

Electricity and the Panama Canal—I. John Geo. Leigh. Gives a review of some of the conditions under which the Panama canal is being built, with notes on the power-plant equipment at the Gatum dam and at Miraflores.—Elect. Rev., Nov. 4, 1910; pp. 3¼; illus. 25 cts.

French Coal-Dust Experiments. M. J. Taffanel. Fourth part of abstract from reports published by the Comité des Houillères de France.—Col. Guard., Nov. 4, 1910; pp. 4⅛; illus. 25 cts.

Portland Cement. James Cleghorn. Gives some comments on the new British standard specification.—Ind. & East. Engr., Oct., 1910; pp. 1¾. 50 cts.

Butte Copper Output. Gives production statistics of the Butte mines for the month of October, 1910.—The Mining World, Nov. 12, 1910; 200 words.

The Gold-Bearing Rocks of Rhodesia —II. A. E. V. Zealley. Continuation of reprint from the eighth annual report of the Rhodesian Museum.—S. Afr. Mg. Jnl., Oct. 15, 1910; 1500 words. 25 cts.

The Tieton Canal. Describes the construction of the Tieton canal of the Reclamation Service in the state of Washington.—Cem. Age, Nov., 1910; pp. 6½; illus. 25 cts.

The Essex Cut and Cover Section of the Catskill Aqueduct. Treats of the method of constructing this portion of this aqueduct.—Eng. Rec., Nov. 5, 1910; pp. 3 1-6; illus. 20 cts.

Zinc Mining Operations in Mexico. Discusses the effect of the new U. S. tariff on the Mexican zinc industry, and treats of present zinc-mining operations. —The Mining World, Nov. 12, 1910; 800 words.

German Miners' Insurance and Annuity Funds—III. Frederick L. Hoffman. In this installment widows' and orphans'

pensions are discussed. The average widow's pension is $45 per year and the average orphan's pension $18.42. E. & M. J., Nov. 12, 1910; pp. 2. 20 cts.

Occurrence of Oil and Gas. William Forstner. Discusses the occurrence of oil and gas-bearing zones in the main range and upper part of the east flank of the Temblor range, California.—M. & S. P., Nov. 12, 1910; pp. 4¼; illus. 20 cts.

Frictional Losses in Small Air Pipes. Elmo G. Harris. Abstract from Bulletin of the School of Mines and Metallurgy, University of Missouri, giving experimental data bearing upon the use of compressed air in small pipes and coefficients of friction recommended for practice.—Mg. Sc., Nov. 10, 1910; pp 2¼. 20 cts.

Hints to Ore Shippers and Smelter Rates. S. E. Bretherton. Abstract of paper presented at meeting of the Amer. Mg. Congress at Los Angeles, giving hints for the prevention of inaccuracies in sampling, metal losses, and methods of estimating smelter charges.—The Mining World, Nov. 12, 1910; pp. 2.

The Gold District of Paracale-Mambulao, Ambos Camarines. Warren D. Smith. Gives notes on the geology and the placer and lode-mining operations in different parts of the district.—Philip. Monthly, Sept., 1910; pp. 4; illus. 30 cts.

Steam Road Tractors and Portable Engines. L. Crouch. Continuation from October issue. This installment deals mainly with the fuel and water-carrying capacity of various engines.—Eng. Rev., Nov., 1910; pp. 6¾; illus. 25 cts.

North Butte Co.'s Operations. John D. Pope. Abstract from the general manager's report for the 3 months ending Aug. 31, 1910.—The Mining World, Nov. 12, 1910; 1250 words.

Chemical Control of Oil Gas Manufacture. E. L. Hall. Conclusion of article from issue of Nov. 5. This installment treats of miscellaneous control; control of operating conditions and technical report; valuation of raw materials; experimental work; appliance work and illumination photometry.—Jnl. of Elect. P. & Gas, Nov. 12, 1910; pp. 3¾; illus. 20 cts.

The Railways of Brazil. Lionel Wiener. Eighth article of series treats of the railways in the state of São Paulo.—Cas. Mag., Nov., 1910; pp. 9; illus. 35 cts.

Treatment of Low-Grade Ores in Brazil. R. H. Kendall. Conclusion of abstract from Bull. No. 75, Inst. of Mg. & Met., London, describing the method of treatment of low-grade gold ore at the Ouro Preto gold mine. This installment deals with the treatment of sands and slimes, the clean up of the zinc-box precipitates, and with the melting of the gold dust.—The Mining World, Nov. 12, 1910; pp. 2¾.

Gas Producer Design and [illegible]. P. von Zeipel. Treats of [illegible] of progress made in design [illegible] ducers.—Ir. Age, Nov. 17, [illegible] illus. 30 cts.

On Magnetic Effects [illegible] Non-Magnetic Materials. Alexander [illegible] Ross. Paper read before the [illegible] Metals, at Glasgow. Gives notes on re[illegible] the magnetic properties of [illegible] made from nonmagnetic metals.—Eng., Nov. 4, 1910; pp. 3¼; illus. 75 cts.

Copper Deposits in Shoshone County, Idaho. [illegible] County, Idaho. Deals with the occurrence of the copper ore bodies, the mine developments, stoping, plant, and equipment at the properties of the Clara Con. Gold & Copper Mining Co. at Swansea, Ariz.—The Mining World, Nov. 12, 1910; pp. 2; illus.

Notes on Coal Mining in India. Gives first installment of comments from a report by J. R. R. Wilson, chief inspector of mines in India.—Ind. & Engr., Oct., 1910; pp. 2; illus. 50 cts.

Report of Committee on Exterior Treatment of Concrete Surfaces. L. L. Wason. Continuation from October of report submitted to Natnl. Asso. of Cement Users, treating of coating surfaces in various ways, such as ornamental treatment, waterproofing; limitations, defects, blemishes of various sorts and remedies; specifications, and costs.—Cem. Age, Nov., 1910; pp. 9. 25 cts.

Bureau of Mines Mine-Rescue Car. Describes the new mine-rescue cars and outlines the campaign of first-aid and mine-rescue education which the Bureau of Mines is to conduct in the various coal-mining districts of the country by aid of these cars.—The Mining World, Nov. 12, 1910; 1000 words.

Construction Plant at the Minnesota Steel Works. Gives a brief description of the plant used in constructing the new plant of the Minnesota Steel Co., at New Duluth, Minn.—Eng. Rec., Nov. 5, 1910; 1600 words; illus. 20 cts.

The Patio Process. Fred MacCoy. Gives a brief description of the patio process for the extraction of silver from its ores as carried out in Mexico.—E. & M. J., Nov. 12, 1910; 800 words; illus. 20 cts.

The Hardness of Minerals. Gordon Surr. Calls attention to the importance of the hardness test in the identification of minerals and explains how it may be made.—The Mining World, Nov. 12, 1910; 750 words.

Dry Placer Machines. [illegible] M. Peterson. Treats of the working of the dry placers by means of the Quecner crusher and pulverizer, and the Stebbins dry placer tables.—M. & S. P., Nov. 12, 1910; 1000 words. 20 cts.

[illegible] Gives [illegible] Eng. Rec., Nov. [illegible] 1910; [illegible] illus. 20 cts.

[illegible] William Da[illegible] investiga[illegible] World, Nov. 12, 1910

[illegible] Abatement.

[illegible] ments of accomplishing smokeless combustion of coal.—E. & E., Nov. 15, 1910; pp. 1¾. 15 cts.

Peninsula Electric Steel Furnace. Alfred Hunne. Paper read before the Eng. Asso. of the South.—Eng. Rec., Nov. 5, 1910; pp. 1½. 20 cts.

The Rockland District in Nevada. A. Coll. Gives notes on the mines, mills and geology of the Rockland district, which lies in Esmeralda county between Lake Walker and the California border.—The Mining World, Nov. 12, 1910; 850 words.

Electrolytic Determination of Lead in Ores. R. C. Benner and W. H. Ross. Describes a method in which the lead is deposited quickly as pure lead peroxide on the anode.—M. & S. P., Nov. 12, 1910; pp. 1¾. illus. 20 cts.

Manufacture of Metallic Tungsten and Ferro-Tungsten. L. R. Pratt. Gives brief description of the methods used in the manufacture of these substances.—E. & M. J., Nov. 12, 1910; 750 words. 20 cts.

Ore Deposits of New Mexico. Gives a review of U. S. Geological Survey Professional Paper 68, entitled "The Ore Deposits of New Mexico."—The Mining World, Nov. 12, 1910; 800 words.

Sixty Years of Rainfall in California. Alexander G. McAdie. Abstract from The Pacific Rural Press, giving and discussing diagrams showing of the seasonal rainfall from 1849 to the present time at San Francisco and San Diego.—M. & S. P., Nov. 12, 1910; pp. 1½. illus. 20 cts.

Impressions of Recent Hydro-Electric Practice in Switzerland. W. F. Durand. Gives in generalized form the results of observations made recently on the present status of hydro-electric work in Switzerland, as shown by the more recent plants in operation, and by some of the most notable of those under present installation.—Eng. Rec., Nov. 12, 1910; pp. 3½. illus. 20 cts.

The Florence-Goldfield Co.'s Mill, Nevada. A. H. Martin. Gives notes on this company's mine, and describes the mill and equipment.—The Mining World, Nov. 12, 1910; pp. 1¾; illus.

The Outlook for Hydrometallurgy of Copper. William Greenwalt. Discusses the limitations of the smelting process, the difficulties of wet methods for extracting copper from ores, and the theoretical advantages in their favor; and outlines some of the present processes. E. & M. J., Nov. 12, 1910; pp. 4. 20 cts.

[illegible] Eng. Rec., Nov. 12, 1910; pp. [illegible] cts.

[illegible] Gives [illegible] partment from the Bureau of the Mint on the consumption of gold and silver in the arts in various countries of the world.—E. & M. J., Mining World, Nov. 5, 1910; 1500 words.

[illegible] Gives data on the [illegible] 1000 words; illus.

New Publications.

Fifteenth Biennial Report of the State Mine Inspectors for the Two Years Ending June 30, 1910. Des Moines, Iowa. Emory H. English, State Printer. Pp. 99.

The Production of Asbestos in 1909. By J. S. Diller, Washington, D. C.; Government Printing Office. Advance Chapter from Mineral Resources of the United States for 1909. Pp. 11.

A Reconnaissance of Parts of Northwestern New Mexico and Arizona. By N. H. Darton. Washington, D. C.; Government Printing Office. Bulletin 435, U. S. Geological Survey. Pp. 88; illustrated.

Report on the Cherry Mine Disaster. Issued by the State Board of Commissioners of Labor, David Ross, Secretary. Springfield, Ill. Illinois State Journal Co., State Printers. State of Illinois Bureau of Labor Statistics. Pp. 90, illustrated.

The "Mechanical World" Pocket Diary and Year Book for 1911. Manchester, England; Emmott & Co., Ltd. "Mechanical World" Offices. Pp. 339; illustrated. 35 cts. For sale by The Mining World.

Like the past editions of this handy little book, the present one contains a large amount of carefully indexed information of value to mechanical engineers and mechanics, consisting of useful engineering notes, rules, tables and data. In this edition the contents have been considerably increased over past editions, and the old matter has been considerably revised and condensed. There is a new section on standard screw threads, one on high-speed steel and its treatment, another giving much data on annealing, hardening and tempering, and still another on the constructive details of the gas engine. The book is of convenient pocket size.

Richardson's Manual of Mexican Law. By D. A. Richardson and Frank W. Doan, Denver, Colo.: W. H. Courtright, law publisher. Pp. 382. $3. For sale by The Mining World.

Mining men, investors, lawyers and others doing business in Mexico can inform themselves on the Mexican laws of corporations, mines and mining by means of this pocketbook. The book contains a complete verbatim translation of all the statutes pertaining to corporations, mines and mining in effect in Old Mexico in 1910, with every section annotated. In addition, it gives forms for corporation, mine and mining in both English and Spanish, so that correct Spanish forms may be used by persons who do not understand Spanish. The subjects are treated as follows: Book I, The Law of Corporations; Part I, Introduction; Part II, Corporation Statutes Annotated; Part III, Forms. Book II, The Law of Mines; Part I, Introductory; Part II, Mining Laws and Regulations Annotated; Part III, Regulations; Part IV, The Conveyance of Mining Property; Part V, Taxes and Stamps; Part VI, The Notarial Law; Part VII, Forms; Part VIII, Glossary of Mining Terms.

Legal Decisions.

Injury to Miner; Safety Cages.—The statute of Montana requires iron-bonneted safety cages with door in mine shafts over 300 ft. deep to be used in lowering and hoisting the miners. The provision that the doors must be closed "when lowering or hoisting the men" must apply to the singular number as well as the plural, and requires the closing of the doors during the hoisting or lowering of one or more miners. The statute was not complied with by closing the doors only when the shifts of men employed in the mine were being lowered and hoisted at the usual time of changing the miners. And where the statute provides that when the cage is used for sinking only it need not be equipped with such doors, the term "sinking" is not technical, but means descending, going down, excavating downward without substantial deviation from a straight line, and does not include the cutting of stations so as to relieve the operators from providing doors to such cages during such operations. Evidence in the trial for an injury to a miner while in such cage, showing that he entered the cage from a station from one side and that his foot got off or over on that side where it was crushed, was sufficient to show that his foot extended out of the cage through an opening where there should have been a door, and made it clear that the absence of the door from the cage was the proximate cause of the injury.—Osterholm vs. Boston & Montana Consolidated Copper & Silver Mining Co. (Montana), 107 Pacific, 499.

Injury to Miner; Liability of Operator.—A mine operator was not liable in an action for injuries to a miner injured while hoisting timbers by means of a rope and block with a pulley, where the evidence showed that a similar rope had been used by other miners for a long time with profit, efficiency and safety, and that while it was not as well adapted for the work as it would have been had it been fitted with an iron or steel attachment, it was not obviously dangerous, and the mine operator was not negligent in failing to furnish a rope with iron or steel attachment. And in no event would the mine operator be liable where the evidence showed that the timber escaped because the rope was not properly tied by the miner; neither would he be liable where the evidence showed that the timber escaped from some unknown cause. To make the mine owner liable in such case it is necessary not only to show that the miner was injured during the course of his employment, but that the injury was proximately caused by the negligence of the mine operator.—Cummings vs. Reins Copper Co. (Montana), 107 Pacific, 904.

Notice of Location of Mining Claim.—The statute of Nevada does not require the notice of the location of a mining claim to be recorded. And a notice of location of such a claim, though not in strict compliance with the statute as a certificate of location, and therefore not evidence of an act of location, is admissible in support of a claim in adverse possession. The rule is that such a notice is not required to be strictly exact, and is not controlling, and that courses and distances given therein yield to the monuments erected on the ground. It is also the rule that the filing of a defective certificate of location, or the failure to file any certificate does not invalidate the claim. Neither does the fact that the end lines of a mining claim are not parallel invalidate the location, but only affects extralateral rights.—Gibson vs. Hjul (Colorado), 108 Pacific, 759.

Option on Mining Claims.—A contract to convey mining claims for a specified sum in cash and other payments to be made in one or two years, with a stipulation that the purchaser might take possession of the claims and develop them, and providing that the purchaser should abide by the terms of the agreement and in default of any of the payments to surrender such claims to the owner and forfeit all moneys paid and expended, is nothing more than an option, and the purchaser is left to his election within the life of the agreement to purchase or a forfeiture of all sums paid or expended. But the purchaser entering under such an option and employing laborers to perform the work can establish no indebtedness in favor of the miners against the owners, and no lien attaches to his interest in the property, as such work is not performed by virtue of any employment from the owner, and the person holding such option is neither a vendee nor an agent of the owner. In such an option time is said to be of the essence of the contract and a failure of the original purchaser or his assignee to pay the balance due on the specified debts relieves the original owner of any obligation to convey under the option agreement and all rights are forfeited.—Harper vs. Independence Development Co. (Utah), 108 Pacific, 701.

Patents Relating to Mining.

Week of Nov. 15, 1910.

Sluice Gate. William M. Creager and Thomas C. Hall, Dallas, Tex. (975,400; filed Jan. 15, 1910.)

Shaking Grizzly. Charles H. Gunn, Marysville, Cal. (975,413; filed Sept. 20, 1909.)

Mining Machine. Frank L. Sessions, Columbus, Ohio, assignor by mesne assignments, to the Jeffrey Manufacturing Co., a corporation of Ohio. (975,468, filed Nov. 16, 1907.)

Conveyor Belt. William H. Metzler, Akron, Ohio. (975,560; filed Nov. 22, 1909.)

Conveyor. Moe Samuels, Jacob Mussell, Caldwell, Idaho. (975,565; filed Jan. 27, 1910.)

Electric Furnace with Magnetically-Rotated Charge. Henry Noel Potter, New Rochelle, N. Y., assignor to Geo. Westinghouse, Pittsburg, Pa. (975,571; original application filed July 25, 1904; divided and this application filed July 1, 1905.)

Placer Separator. Dudley J. Forbes, Portland, Oreg., assignor to the Hydraulic Gravity Separator Co., Portland, Oreg. (975,881; filed July 7, 1908.)

Amalgamator. Joseph H. McNeil, East Stoughton, Mass. (975,704; filed May 11, 1908.)

Crude Oil Burner. George C. Yale, Boynton, Okla. (975,710, filed Nov. 22, 1909.)

Hammer Drill. William Prellwitz, Easton, Pa., assignor to Ingersoll-Rand Co., New York, N. Y., a corporation of New Jersey. (975,891; filed Feb. 15, 1909.)

Ore Classifier. Arthur D. J. Malchus, Silverton, Colo. (975,971, filed June 27, 1910.)

Treatment of Precious Metalliferous Ores. John Collins Clancy, New York, N. Y. (976,43; filed July 12, 1909.)

Progress Made in the Manufacturing Industries.

Largest Gyratory Breaker in the World.

The illustration shows the largest ore breaker ever built, loaded on the train for transportation to Biwabik, Minn., where it will be installed in the plant of the Biwabik Mining Co. This huge breaker, which can produce a 40-car train-load of crushed rock each hour, stands 28 ft. high and weighs over 500,000 lbs. The two receiving openings are each 48 by 108 ins., and will take pieces of rock weighing 10 tons, which it crushes as easily as egg shells are crushed in the hand.

The development of rock-crushing apparatus, from the time when stones were broken by dashing one against another, until this present record-breaking machine, has always been due to an immediate demand, and the machine has been developed to meet existing conditions, rather than to act as a stimulant to an enterprise. The development of the crushed-stone industry has brought about a rapid advance in crushing machinery,

The Mining World invites manufacturers of machinery and supplies to forward their latest catalogs, as well as news items of sales made and illustrated descriptions of new inventions or improvements.

[illegible] work, however, has reached such proportions that the old breaker is no longer capable of handling the [illegible] and the breaker just described is now being installed. This breaker was built by Allis-Chalmers Co., which also built the one now being discarded. It is known as [illegible] No. 21 and is the largest ever built by [illegible]

Trade Publications.

Graphite Products for Use Underground. Joseph Dixon Crucible Co., Jersey City, N. J. Booklet, pp. 16, illustrated. Covers the full line of Dixon products

trifugal pumps to the irrigation of various [illegible] alfalfa, etc. Methods of installation and actual installations are illustrated and explained. The many illustrations consist of diagrams and half-tone views.

Telephone Switchboard. Stromberg-Carlson Mfg. Co., Rochester, N. Y. Pamphlet No. 33, illustrated.

Illustrates and describes this company's No. 397, 30-lamp line capacity, [illegible] branch exchange switchboard.

Industrial Notes.

S. B. Whinery, 95 Liberty street, New York city, has been appointed New York representative of the American Well Works, Aurora, Ill.

The Hydraulic Cyanide Agitation Co., of Warren, Pa., has made arrangements with the United Iron Works, of Oakland, Cal., whereby this firm, with offices in Los Angeles, Seattle and Spokane, will

Shipping the Largest Gyratory Breaker Ever Built.

which has been furthered by the mining interests as in this case.

The Biwabik Mining Co. has extensive iron-ore mining properties which have been developed on the open-pit system. This permits the open blasting of the ore, which comes loose in large pieces, that can be loaded on quarry cars by steam shovel. Most of the ore is taconite, one of the hardest of iron ores, and its crushing to suitable size for blast furnace work is a hard problem.

To handle this ore the Biwabik Mining Co., in 1901, installed the largest and most powerful breaker that had been built up to that time, and this naturally attracted considerable attention. This breaker has been in practically continuous service since that time. The enlarge

[illegible] ical departments of railroads. These include various graphite lubricants, protective paint, crucibles, facings, etc., all of which have been found to [illegible] satisfactory results. The booklet is attractively illustrated by means of [illegible] and prices [illegible] this booklet will [illegible]

[illegible] Well Works, Aurora, Ill. Bulletin No. [illegible]

[illegible] up in an unusually [illegible]

trifugal pumps to the irrigation of various [illegible] alfalfa, etc. Methods of installation and actual installations are illustrated and explained. The many illustrations consist of diagrams and half-tone views.

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[illegible] Brown, Wolcott & Russell, Inc., 300 Market street, San Francisco, have been appointed Pacific Coast selling agents for the Alberger Pump Co., New York city.

Mr. Walter Brinton, superintendent of the manganese steel department of the Taylor Iron & Steel Co.'s plant at High Bridge, N. J., since 1895, has resigned, and has accepted a position as [illegible] engineer for the Edgar Allen American Manganese Steel Co., which is now erecting manganese steel [illegible] Chicago Heights, Ill., and at New Castle, Del. Mr. Brinton's headquarters will be at the New Castle plant.

Personal.

W. E. Orem of Salt Lake City, recently inspected properties in Yerington, Nev.

William Barker, assayer of Juneau, Alaska, has opened an office in Tacoma, Wash.

R. C. Vanderford, mining engineer of Spokane, Wash., is examining properties in Montana.

H. M. Adkinson, manager for the Gold Pioneer Mining Co., Telluride, Colo., is in the east.

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W. J. Collins, mining engineer of Kansas City, Mo., is examining properties in Sonora, Mexico.

C. A. Wendlet, mining engineer of Spokane, Wash., recently visited properties in Greenwood, B. C.

Eugene Hoffman, superintendent of the Democrata mine, Cananea, Sonora, Mexico, is visiting in Cincinnati.

I. T. Sanborn, of Springfield, Mo., is now connected with the assay office of J. Q. A. King at Phoenix, Ariz.

C. Morgan and H. D. Bradley have opened an assay office at Calzona, Cal., under the firm name of Morgan & Bradley.

M. M. Johnson, mining engineer of Salt Lake City, is in Ely, Nev., where he is inspecting the Ely Centennial property.

Arthur Dickerson, mining engineer of New York, is in Prescott, Ariz., examining mining properties for eastern clients.

J. W. Woodrow, who for several years has been consulting engineer with Phelps, Dodge & Co., at Bisbee, Ariz., has resigned.

Emerson Gee, mining engineer of Los Angeles, Cal., recently visited properties near Little Meadows, Mohave county, Arizona.

H. N. Coleman, general manager for the Sunnyside Mining Co., near Prescott, Ariz., is in Chicago on business for the company.

Raymond Brooks, superintendent of the Golden Silver Pick mine, Goldfield, Nev., is in Los Angeles, Cal., and will later go to Texas.

W. H. Deavitt is in charge of the Veta Grande mines owned by the American Smelters Securities Co., at Minas Nuevas, Sonora, Mexico.

Darcy McKee, mining engineer of Montreal, recently made a tour of inspection of mines in the Greenwood district, British Columbia.

Hugh McDonald has resigned as manager for the Silver King Coalition Mining Co., Park City, Utah, and will be succeeded by [illegible].

Thomas M. Schumacher, who recently succeeded A. L. Pitts as superintendent of the Uintah Power railway, has resigned to go out the coast as traffic manager of the American Smelting & Refining Co. Mr. Schumacher will succeed Mr. Sproule on both the board and executive committee of the American Smelting & Refining Co.

D. J. Thompson, general manager for the Federal Mining & Milling Co., Prescott, Ariz., was recently in Chicago on business for the company.

W. Spencer Hutchinson of Boston, is at present making an examination of the property of the Mexican Metals Co., near Magdalena, Sonora, Mexico.

R. L. Reinecke of the Canadian Geological Survey has returned to Ottawa from his work on the west fork of the Kettle river, British Columbia.

H. McMaster of Toronto, Canada, manager and director of the Golden Beaver Mining & Milling Co., near Breckenridge, Colo., recently visited the property.

Howard W. Dubois, mining engineer of Philadelphia, Pa., general manager for the Quesnelle Hydraulic Gold Mining Co., has been visiting in Vancouver and Victoria, B. C.

S. E. Bretherton, consulting engineer of San Francisco, Cal., who is doing professional work in the state of Sonora, Mexico, expects to return to San Francisco by Dec. 1.

George T. Stenhouse, manager for the Morgan-Crescent Mining Co., in Morgan county, Utah, and Charles E. Bergenzer, mining engineer of Chicago, recently visited the properties.

S. S. Raymond, of Los Angeles, Cal., formerly manager of the Britannia smelter at Crofton, B. C., recently examined mining properties in the Sheep Creek camp, near Nelson, B. C.

M. J. B. Lowenstein, manager for the El Aguila Oil Co., Parral, Chihuahua, Mexico, has resigned and will go to the Mexico City office of the company. He is succeeded by Mr. del Valle.

E. A. Dave, formerly in charge of the Agavnico Mines Development Co.'s mine in Dubuque, Iowa, is now in charge of the Green Mountain Con. Mines Co.'s properties near Howardsville, Colo.

H. L. Kingsmill, formerly with the Consolidated Goldfields Co., of South Africa, and later with the New Jersey Zinc Co., is now in charge of the Goldfields Con. property in the Porcupine district, Ontario.

Walter Harvey Weed and J. A. Percival, secretary of the Butte-Ballakalava Copper Co., are in Butte. Mr. Weed is making an examination of the ore bodies in controversy between the Anaconda and Butte-Ballakalava companies.

L. E. Wilson, of the engineering firm of Dutcher, Maxwell & Gregory, Vancouver, B. C., has completed a preliminary survey for the proposed hydro-electric plant of the Stewart-Portland Canal Light, Power & Water Co., and has returned to Vancouver.

W. L. Garrison has resigned as manager for the Inde Gold Mining Co., Inde, Durango, Mexico, and has been placed in charge of properties in New Mexico, owned by the same people. R. McCart, who has been assistant manager, will succeed him at the Inde.

Charles Watson, who for some time has been manager of the Cobalt Townsite property in Cobalt, Ont., is now manager of the Armstrong-McGibbon properties in North Tisdale, in the Porcupine district, Ontario. He will be succeeded at the Cobalt Townsite by A. C. Bailey, who has been in charge of the Casey Cobalt property. John Shaw, assayer and surveyor for the King Edward mine, and in charge of the Cochrane Cobalt, will be superintendent of the Casey Cobalt.

Obituary.

Fitz-James McCarthy, who under the name of "Fitz-Mac" contributed largely to the mining press of the country, was found dead in bed at his home in Phoenix, Ariz., Nov. 15. He was 63 years old, and was well known in the mining districts of Arizona, Colorado and Nevada.

John Howell, mining engineer formerly of Nevada, and later of Australia, died at his home in Denver, Nov. 14. He was in the Comstock region in the early days and in Utah, Montana, and other western mining fields. In 1888 he was sent to Australia by an English syndicate to manage the Broken Hill property. He returned to America in 1906 because of failing health, and has since made his home in Denver.

Charles H. Tucker, secretary and treasurer of A. Leschen & Sons Rope Co., St. Louis, who died in Clifton Springs, N. Y., on Sunday afternoon, Oct. 30, was one of the best informed and known wire rope men in this country, having been closely identified with that great industry in various capacities for 26 years. He was born in New York city 50 years ago and as a boy secured employment with the Western Union Telegraph Co., subsequently going into newspaper work, serving as a dramatic critic on the New York World. While yet a young man, he entered the New York office of John A. Roebling's Sons Co., advancing steadily in their service until 1898, when he went to A. Leschen & Sons Rope Co., with whom he remained until his death. In Mr. Tucker was exemplified the rare versatility wherewith as an eastern man trained to manhood in eastern business practice, he was enabled to adapt himself to western methods and utilize them with large success. He became ill on the train while on a short business trip to the Pacific Coast in July, but with characteristic determination finished his business, although under the stress of great physical difficulty. Shortly after his return east, he joined his wife and daughter at their summer home in Ocean Grove, N. J. Subsequently at the approach of cool weather, they removed him inland to Clifton Springs, N. Y. His death is mourned by a large number of business friends and associates.

Since the discovery of Chile, gold has been mined in that country of the value of $222,923,005; silver, $311,093,058; copper, $658,575,153, and nitrate, $1,-[illegible]2,864,274.

Late News From the World's Mining Camps.

By STAFF CORRESPONDENTS.

ARIZONA.

Prescott.

The Swastika Development Co., whose property is in the Bradshaw mountains, is putting in a 10-hp. gasoline engine and pump which will be used to unwater the Black Warrior mine. This mine is being worked with the Silver Prince. Work was resumed on these mines about 6 months ago. The old shafts have been cleaned out.

At the Gladstone group of mines a rich ledge of sulphide ore was recently struck, and development work will be pushed.

Prospecting with churn drills is being done in the neighborhood of Dewey. Rich placer prospects have been discovered and some ground has been located.

The lawsuit between the United States government and the estate of the late Joe Mayer has been settled. This suit was over the character of five placer mining locations. Their mineral character has been established. The decision will settle the title to 100 acres now under mineral location. Part of the town of Mayer is located upon this land.

Activity in the Cherry Creek district is increasing. The mines undergoing development are showing favorably.

The new equipment or machinery purchased by the Pacific Copper Co. is being shipped to Crown King, whence it will be freighted to Silver mountain, where the company's properties are located.

Groom creek mining properties already feel the benefit of the new territorial highway passing through that locality and which will be ready for heavy traffic at an early date. The Sunnyside Mining Co. is preparing for further development work and expects to mill its own ore. The Home Run mine will be worked under bond. Activity is general among the owners of mining property.

Cerbat.

In one day recently two men took from the stope on the 200-ft. level of the C. O. D. mine at Cerbat, 17 sacks of ore of high value. In this stope the values run to gold. Owing to the heavy flow of water a drift is being carried off at the 200-ft level, where good ore is being taken out of a new vein. Through that drift the water in the former workings is being lowered and when the 300-ft. level is reached it is thought that the water pressure from the old workings will have been reduced to a minimum. As soon as the mine is opened and connection made with the 300-ft. level, a large tonnage of ore will be obtained and regular shipments made to the smelter at El Paso.

Jerome.

The Little Daisy improves with development. This mine is operated by the United Verde Extension Mining Co. Work on the lower levels of the Little Daisy is now through siliceous rock stained by iron and copper, with veins of malachite. This is the wall formation between the rich ore bodies. Wherever there is an increasing volume of water which crosses [illegible] cutting [illegible] in larger pumps recently.

The Haynes Copper Co. is at work on a gold-bearing ledge 6 ft. wide.

On the Arkansas & Arizona the shaft is being sunk from the 900-ft. level.

G. W. Hull is to resume the Humboldt Gold Co. and put a force of men at work on its property at Humboldt. This mine has been idle for years.

Mesa.

A new ledge 3 ft. wide and running high in gold, has been accidentally uncovered in the Mammoth mine at old Goldfield, 16 miles east of Mesa, while paying ore is being taken from two stopes in the old workings. One of these is the Montana stope, from which $500,000 worth of gold was taken in the early days of the district and which is believed to have considerable more. The new find is now being worked 100 to 200 ft. west and the newly discovered ledge is only 40 ft. away. Samples taken from the ledge run from a few dollars to the ton up into high values, both from the old and new shafts. Ore running from $12 to $50 is being taken from another stope in a different part of the mine.

Crook Canyon.

At the bottom of an 80-ft. shaft, J. H. Cross recently struck a good body of gold ore. The vein is over 4 ft. wide, streaked with 18 ins. of high-grade ore. He expects to have a shipment ready for the smelter at an early date.

The new mill has been treating ore from the Venezia mine since Nov. 3, and a clean-up will soon be made. This ore is free milling. Development shows that the mine has a much larger body of ore than was supposed. This mine has good buildings.

From a limited depth R. L. Chubb has just taken out 700 tons of ore which will yield $20 per ton.

Rough Rider has [illegible] at work on its property [illegible] to drive a tunnel to the [illegible].

Chloride.

It is reported that the Grand Mogul Mining Co. has taken over the Apache Chief group of mines near Chloride, and will begin development [illegible] parallel siding, and will begin development [illegible] machinery.

Humboldt.

[illegible] reported that the success of the strike in the Humboldt mine, in the big [illegible] ore body 14 ft. wide, in silver, besides a heavy percentage of lead. The [illegible] ore [illegible] gold. The [illegible] ore [illegible] a gold [illegible].

Paradise.

[illegible] property of the Cochise Con. Copper Co. [illegible] Messrs. Hagan and James.

CALIFORNIA.

Alleghany.

A 3-ft. ledge of free gold-bearing quartz has been struck in the Nixon group in Bear creek, W. J. Nixon, owner.

The mill on the Bear creek mine, which had been shut down for lack of water, will resume Jan. 1. Cross drifts are being run from the main adit level to catch the richer ledge.

The Crocesus mine, at Pleasant [illegible], C. W. McMeekin, manager, has made its quarterly shipment of concentrates, consisting of forty tons of high-grade gold-bearing sulphides. Driving is in progress on the main level looking for new chimneys.

A new tunnel has been started on the Queen Nadagonde claim, on Kanaka creek, near Jungletown. Frank B. Smith, formerly of Tonopah, is managing lessee. J. J. Hearn & Co., of Nevada City, are the owners.

The long-sought earth, assays of which Eighteen bonanza ledge, was encountered in the Red Star mine, on Oct. 14. The ledge is over 6 ft. wide and carries coarse free gold and high-grade natural sulphides. The mine is owned by Alleghany people, but has been under development, under bond and lease, by a company in which Denver and Cripple Creek, Colo., people are large stockholders, among them being Dr. J. N. Deegan, formerly mayor of Leadville and Phil Feldhauser, of Cripple Creek. The mine is under the management of L. P. Wood Berry, with E. S. Brindle as superintendent. The company expended $80,000 in reopening an old tunnel, driven 50 years ago to tap the gravel deposit at the ancient channel of the Big Bar road in the ridge between Alleghany and Forest. After the diggings were worked out the tunnel was abandoned and lay idle until 3 years ago, when Woodberry and associates took hold. The [illegible] cross-cut [illegible] 3000 ft. and [illegible] Upper ledge just north [illegible] Both were [illegible] [illegible] [illegible]

Robinson, who are sinking a shaft on the ledge, which is a northern extension of the Tightner and Alleghany Red Star mines.

The deal involving the Kate Hardy has fallen through, W. E. Duplancie relinguishing his bond. The mine is now under the management of Capt. J. W Morrell, who with W. M. Beggs, of San Jose, has the property under bond and lease from Tyler Dudley

An electro-chemical process plant is being installed at the Omega draft-gravel mine by F. W. Rohrer, of Oakland and associates. This is to be operated supplementary to the disintegrating mill now at the mine

The 200 ft. incline in the North Fork mine has been bottomed in the North Fork placer, and the Uncle Sam ledge is being drifted for.

Several rich strikes have been made this fall in the country to the east of here, along Wolf creek and in what is known as the Milton basin. It is a slate belt, 15 miles wide, lying between the Alleghany and Sierra Buttes serpentine dikes, with the Graniteville granite dike cutting through about midway. During the past year a large number of locations were made upon ledges enclosed in the slate. The district is practically virgin, and is best reached by wagon road from Beckwith.

The Lucky Strike mine at Secret canyon is being incorporated by A. Max, of San Francisco, and Geo. W. Henk, the latter being the present superintendent. The property contains a big vein and two ledges, all gold bearing.

The Columbia drift mine, at American hill, which has been running lightly since last July because of shortage of water, will return to its normal working force on Jan. 1. The mine has a large acreage of lava-capped, placer ground, developed by a long bedrock tunnel, tapping the gravel channel with 22 raises. Wm. Sharon is one of the principal owners. J. M. Harper is superintendent.

Pay gravel has been struck in the Mabel Mertz drift mine, at American hill, owned by the Forest City Mining Co., W. I. Redding, president. Hugh McCormick is superintendent.

The I. X. L. mine, which was bonded to Beggs & Taylor, has been sub-bonded by the latter to W. E. Duplantee, who has a bond on the Kate Hardy and other claims on the Brush creek bonanza ledge.

Tuolumne.

The Water Lily gravel mine has been bonded to J. L. Witney of Los Angeles, and a crew of eight men has been put to work. The property consists of 60 acres and is situated near Bostick bar, on the Stanislaus river. It was worked extensively many years ago, producing more than $4,000,000.

Ore of remarkable richness has been encountered in the Harbart Camp mine, only recently bonded to an eastern syndicate. The vein is streaked with gold and the indications are that the ore body is a large one. The price to be paid for the property, which adjoins the Belle View on the north, is said to be $45,000. The former operators developed several shoots of milling ore and lately installed a 4-stamp mill on the property. The crew employed in development work is to be immediately increased.

Santa Monica people have taken a bond on the Wickham mine, near the Rawhide, and are preparing to thoroughly develop the property. The vein has been tapped 100 ft. below surface and opened a distance of 100 ft each way by drifts. Among the surface improvements is a modern 5-stamp mill.

A tunnel is being driven at the Leap Year gravel mine, near Jamestown. Eight men are employed, and it is expected good gravel will be encountered within a short distance.

The new 20-stamp mill at the Tarantula mine is nearing completion. Once started it will be kept continuously in operation, the supply of ore ready for extraction being large. Besides this there is much which was taken out in the development of the property. Some high-grade ore has been found in several places.

The Karnac Mining Co. has purchased a 10-stamp mill for its property near Rawhide.

It is reported some development work will shortly be done at the Santa Ysabel.

The United Mines Corporation is employing about 40 men at its property near Tuolumne, although working but one of the group—the New Albany. A winze has been sunk 200 ft. from the 700-ft. level and driving is now in progress both north and south. The winze will be sunk 200 ft. deeper and other drifts will be started. Only the ore extracted in development is being milled at present, but stoping will be resumed soon and the mill kept in continuous operation.

Downieville.

The Phoenix mine, above Sierra City, has just started its stamps.

Work will be continued all winter at the Independence mine on Wolf creek. A new house for the use of Supt Pearson and family has just been completed.

On account of the hard rock encountered in drifting in the Standard mine, in Sailor ravine, the progress is slow, but rich sulphides such as were found in the tunnel above are found in the drifts. Jason Frye is superintendent.

Two hundred acres of copper claims have just been located near the Plumas and Sierra counties line by people interested in the Four Hills mine. This copper belt, though known to be extensive, has hitherto been neglected, but new and better transportation facilities will now justify the development of these deposits.

Rich ore has been encountered in tunnel of the Sovereign mine in Ladies canyon, where it cut the ledge 350 ft. below the shaft on outcrop, where ore assayed very high. F. O. Richardson is superintendent.

The tunnel on the Brown Bear property on St Charles Hill is in over 100 ft. Nine hundred feet more will be run to strike the channel. All supplies for work throughout the winter have been delivered at the mine. John Schofield has charge.

From 12 to 20 men will be kept at work this winter at the Deadwood gravel mine, near Poker flat. Snowsheds have been erected and 6000 lbs. of provisions and supplies have been packed to the mine. A. B. Call is operating this property

Nevada City.

The Coan quartz mine, at Indian flat, has been bonded by Thos. Coan to C. D. McGonigal, of Alleghany, who is now sinking the shaft 200 ft. deeper, and will increase the capacity of the mill by 10 stamps. The quartz runs from $10 to $50 per ton in free gold

Graniteville.

The Birchville Mining Co. is replacing the burned surface works of the Poorman's mine with a new hoisting plant, installing new pumps, and will get to active mining again by next spring. At the time of the fire the drifts were in good ore, the quartz being free milling, with a galena concentrate that runs $800 in gold.

Bishop.

Nevada people have acquired the Reward and Brown Monster mines, 10 miles from Independence. The Reward is equipped with a 20-stamp mill, compressor and drills. A cyanide annex will be installed at once.

Placerville

At the Stillwagon mine a full force of men is employed and the mill is operating steadily. Recent developments in the lower levels have opened considerable high-grade quartz. The company has completed arrangements for developments and it is expected that work will continue for an indefinite period.

At the Woodbury properties, comprising the Borealis and Lady Edner mines, an adit is being driven to intersect the channel. Excellent values have been encountered and developments are progressing rapidly. The gravel is of the cemented order, and it is intended to install a gravel mill within a short time. Charles Edner is manager.

The Starkey mine, in the Brownsville district, has been taken over by Charles Edner, A. G. Kulberg and San Francisco associates. Several gold-bearing shoots have been opened in the mine. Operations have been commenced with a full force of men. The Independence has resumed operations.

Sierra City

A large body of quartz has been opened in the St. Louis mine by the Cogley brothers. The quartz runs all the way from 1 to 5 ozs. of gold per ton. A large body of free-milling quartz, running $8 in gold, has also been opened in the Roosevelt, Mora and Sons, owners.

Merced.

Large bodies of low-grade ore have been opened by 400 ft. of drift in the Crown Lead mine. The ledge is from 6 to 10 ft. wide, all gold bearing. Geo. H. Bressette, of New York city, is principal owner. S. E. Lewis is manager.

After 25 years of idleness it is possible that the South Spring Hill mine will be reopened, Charles Kirchlen, of Tonopah, having an option on the property.

San Bernardino.

The Bagdad-Chase and Roosevelt mines, 7 miles south of Ludlow, on a branch line to the Santa Fe railroad, have passed into the hands of the Pacific Mines Corpora-

tion. The new company is capitalized at $1,000,000, with John Hayes Hammond president; James W. Campbell secretary-treasurer, and Frank A. Keith vice-president and general manager.

North Bloomfield.

Gravel running $4 to the cubic yard has been struck in the Blue Lead drift mine at Relief hill. Washing will begin with the advent of winter rains. J. Oscar Jones is lessee and manager.

A. S. Wall of Alameda has struck pay gravel in the Wales Flat drift mine, but owing to the water famine will defer actual mining until next spring.

Pay gravel has been encountered in the Blue Lead drift mine, at Relief hill. Oscar Jones, managing lessee. Active mining will take place with the arrival of water.

COLORADO.

Leadville.

At the Robert Emmet property, in Stray Horse gulch, the lessees have run a drift from the shaft 100 ft. and raised to the ore body. This work was done so that the ore could be taken out more economically than was before possible. During the past month, while this work was being done, production of zinc sulphides have been curtailed.

Miss Elizabeth K. Brown, of Red Cliff, is developing her Killingsworth property on the eastern end of Horn Silver mountain. The claims are being developed by a tunnel which is now in 250 ft., with a depth from the surface of 100 ft. At the face of the tunnel a vein 16 ft. wide has been opened, the bulk of which is iron and manganese. In this ore body streaks of bismuth and graphite have been found, the former running 68% and the latter 42.60%. Alongside of the bismuth streak is a streak of black sulphides carrying gold varying in value from 6.85 to 51 ozs. and silver 86 ozs. The bismuth and sulphide streaks are small, only averaging 2 ins., but the graphite streak is fully 2 ft. wide. The ore came in alongside of an oxidized porphyry dike. A raise has been carried 50 ft. and a winze sunk 25 ft. with the ore showing in both places.

Steady shipments are being maintained from the Forest City mine, on Carbonate hill, where W. A. Forest, lessee, recently opened a good body of iron ore. A body of lead ore carrying good values in silver has also been opened on this property.

Steady shipments of carbonate of zinc ore of good grade are being made by Thomas Smith and associates, lessees on the Stevens shaft on Rock hill. The vein recently discovered is now 8 ft. across the breast of the drift. Four feet of this samples 60% lead, and the remainder, though lower is of a good shipping grade.

A large body of high-grade carbonate of zinc has just been encountered on the Hilltop-Last Chance lease, held by S. Berger and associates.

Ed. Brady is shipping steadily from the body of sand carbonates that he recently opened on his lease on the old Dunning property on Fryer hill. The

[illegible] lead, with lead values in [illegible]

Georgetown.

[illegible] on the Smuggler mine. Drifting and stoping are being done. There is a 10-in. vein of ore that runs well in silver and lead. The ore streak has been opened for 175 ft.

Lack of water has made it necessary to shut down the air compressor at the Pay Rock mine, which has been supplying air to the Dives-Pelican mine.

Cripple Creek.

It is reported that the Stratton Cripple Creek Mining & Development Co. may build another low-grade ore-treatment plant in this camp.

The Western Investment Co., which holds the original lease on the Victor mine on Bull cliffs, has taken possession from the Roscoe Leasing Co., its sublessee, and will operate the property. Subleases will be granted on favorable terms.

Carl Johnson, lessee on the Maggie mine on Raven hill, has encountered a rich ore shoot. A shipment recently made returned for one car of 38 tons, $91.20 per ton, and for another car of 35 tons, $84.20 per ton. Mr. Johnson is preparing to sink the shaft to the 500-ft. level.

Work has been resumed on the Buckhorn mine, owned by the Stratton estate and under lease to Colorado Springs people. The property is located on Globe hill.

The Rapp lease on the Dante No. 2 shaft is producing at the rate of 1 car a day, and the grade is holding at about $25 to the ton. Four sets of sublessees are working in ore. Lessees on the Dante No. 1 shaft are shipping about 3 cars a week of milling-grade ore.

Seattle people have obtained a 3-year lease on the Isabella Mines Co.'s cyanide mill on Bull hill and operations will soon be resumed. Improved machinery is to be installed. A heavy production is being maintained from the Lee shaft and other properties of the Isabella Co. The ore shipped is said to have averaged a little over $20 to the ton.

Telluride.

The Gold Prospect mine is now running 10 stamps in the old Pandora mill on the ore from the Seventy Six mine. This company has discontinued work on the dumps past it has under lease in Marshall basin.

Manager Sonder is [illegible] continuing development work on the Mountain Lion mine at Deep [illegible]

IDAHO.

Wallace.

[illegible] of the stockholders of the Mineral Point Co. the following officers were elected for the ensuing year: J. N. Thennes, of Wallace, president; R. Mallard, Henry Billberg, of Mullan; C. A. Barnes, Harry Chaney, of Missoula, and John [illegible] of Spokane. The company has [illegible] on its claim

[illegible] treasurer's report for the year shows receipts of $28,[illegible] $26,051.43, leaving a balance [illegible] buildings. Underground the ore body has been opened for about 75 ft., [illegible] which is low-grade copper ore. The winze recently started shows a decided improvement in the [illegible] 50 ft. wide and 90 ft. [illegible] copper. The [illegible] the 400-ft. level during the winter.

At the annual meeting of the Hecla Co. the following directorate was elected for the ensuing year: Jay S. Wynne, Lyman Woods, J. R. Adams, W. B. Hendrick and F. C. Norbeck.

The North Dardanelles Mining Co. has called an assessment of 5 cents per share to meet development expenses.

The old Coeur d'Alene Nellie and Emma Nevada properties near Osborne have been purchased by the Wallace Development Co., of which [illegible] is president and manager, [illegible] president and treasurer, and G. A. Marshall, secretary. The Emma Nevada Nellie will be opened by a new tunnel, and [illegible] taken from the surface workings for trial shipment.

Arthur George has started work on the [illegible] and is now [illegible] through the [illegible]

The new buildings at the lower workings of the Snowshoe property at Mullan have been completed. The company will install a 3-drill Franklin air compressor, which will be [illegible] Westinghouse motor. The lower tunnel will be [illegible] ft. long.

The Capital [illegible] has awarded a contract to James Doyle for 100 ft. of tunnel work.

Two tunnel sites [illegible] have been purchased by the Sunset Co. on Shoo and work started on a new tunnel. The company has expended [illegible] development work and has opened a promising lead vein.

The Idora Co. has [illegible] ready for shipment which will be hauled 8 miles to Burke, [illegible] the N. P. The company has [illegible]

Stinson Brothers have secured a contract from the Deer Lodge Mining Co. for 150 ft. of [illegible] work.

The Imperial Co. has completed 3300 ft. of work in the lower tunnel. The main heading is being continued north and a 4[illegible] is in progress on a [illegible] showing where the vein was expected.

The Best Chance property will install a compressor and drill at the [illegible]

At the Coeur d'Alene Vulcan property work has been [illegible] account of a shortage [illegible] power purposes.

The big [illegible] drift on the copper [illegible] Mullan has reached a total [illegible] and will be completed to the [illegible] The total cost per foot has been $[illegible] including all buildings and equipment. The actual tunnel cost is $[illegible] per foot. The [illegible] and directors

elected for the ensuing year are: J. B. Elliott, president; E. B. Crawford, vice-president; H. W. Ingalls, secretary-treasurer and manager; J. A. Vealey and Henry Billberg.

INDIANA.

Indianapolis.

Encouraging developments are being made in several new coal fields and the increased activity of the U. S. Steel Corporation to become a large producer are among the things pointing to a record-breaking year for the Indiana mines.

Fire which has been burning for several days threatens to destroy the Menden coal mine, on the Southern railroad, west of Booneville. The Menden mine is one of the oldest in the pocket field. It is expected all the timbering in the mine will be destroyed. No attempt to open the mine will be made for several days. About a hundred miners are idle because of the enforced shut-down.

More than 5000 acres of oil land, near Stilesville, Monroe county, has been leased by the Standard Oil Co., and test wells are being sunk. The Standard Oil Co. is taking 12-day gage of property of independent companies with the view of taking them over.

LAKE SUPERIOR.

COPPER.

Houghton, Mich.

The South Lake Mining Co. has taken another rich core of copper rock from the unidentified formation which yielded the several rich borings in drill holes Nos. 3, 4 and 5. The latest showing was made in boring No. 6 hole, which is being put down to check up the results obtained in the three previous borings. Although the lateral extent of this rich deposit has not been determined beyond a distance of about 300 ft. the showing is so rich and persistent wherever the deposit was cut into that steps will immediately be taken to investigate it through the medium of shaft and underground openings. The plans for a vertical shaft are being worked out and the site has been determined upon. Before shaft sinking is undertaken, however, it will probably be necessary to bore a fifth hole at that point to more fully understand the conditions obtaining.

Badly shattered and soft ground is interfering with shaft sinking on the property of the Houghton Copper Co. This condition necessarily makes sinking very slow and in addition the company is finding it necessary to cement the shaft as it progresses downward. The shaft has attained a depth of about 135 ft., and is sinking about 60 ft. from the lode which will be opened by crosscuts at the various levels. The construction of necessary mine buildings, including office, change house and a dwelling for the mining captain has been completed. The property is a small one lying between the Isle Royale on the north and the Superior on the south but apparently is of considerable promise, drill borings made before shaft sinking was undertaken resulting in the disclosure of a fairly wide and rich copper bearing formation underlying 80 acres of the company's holdings.

The New Baltic Co. has installed an air compressor to operate the rock drills engaged in shaft sinking and as a result better progress in this work may be expected. The shaft is sinking without interruption and is down about 150 ft. Its course in the foot wall just under the lode occasionally brings the vein into the shaft due to rolls in the formation, and wherever this has resulted a very fair showing of copper ground was noted.

The Isle Royale Copper Co. has sinking well under way in the No. 4 shaft after a cessation of this kind of work for more than a year, and like activity will shortly be resumed in the Nos. 5 and 6 shafts next south and which also have been bottomed for a year or more at present depths. The character of the ground opened in the No. 4 shaft is of unusual promise, and apparently more consistent than the usual run of copper ground in the Isle Royale formation which is notoriously bunchy, exceptionally rich in some spots and lean in others with the leaner ground predominating. The No. 4 shaft is sinking below the 7th level, the No. 5 is bottomed at the 6th level and No. 6 shaft is at the 8th level. In the older No. 2 shaft, which continues to be the main source of production, sinking is in progress between the 28th and 29th levels. Drifting at various levels in this shaft continues to result in the exposure of average ground, though in several of the drifts south and at depth below the old Huron workings a much better grade of rock is being met with. Over in the Baltic horizon, in which the "A" shaft is opened to a depth of over 970 ft., all activity is centered in exploratory work with one diamond drill in service. What undeniably is either the Baltic lode or the Superior lode is exposed in the 3d level south drift in this shaft, but was found to carry small values where opened in the crosscut at the end of that lateral. A drill is now sinking in the formation at that point, but to a depth of about 100 ft has shown nothing more than a well-formed amygdaloid, the copper showings to that depth and at that point proving of no commercial value. This work is not far distant from the point where the Houghton Copper Co. secured a core of rich copper ground at a depth of about 800 ft., and it is in the hope of cutting into a probable extension of this same deposit on its own property that Isle Royale is continuing the exploratory work referred to.

IRON.

Marquette, Mich.

Following extensive exploratory work with the diamond drill, the Rogers-Brown Ore Co. has decided to develop the Menominee iron-range tract in Section 29, 43-34, heretofore known as the Swanson property but which has now been named the Rogers. The prospective mine is in the Stambaugh valley and is one of much promise. The Rogers will be opened by means of a concrete shaft. A shaft of this description is necessary because of the depth and the shifty and wet nature of the surface drift. The site selected is at a point where extensive standpipe work has determined the overburden to be 135 ft. thick. Only a few rods away the underlying ledge of rock drops to a depth of 200 to 300 ft. The surface material is composed of quicksand. The Rogers is expected to be one of the largest producers in the Stambaugh district. Its ore lies a depth well below the average for the Menominee range as the region is now developed, however, and the opening of the mine will be a considerable task. It is hardly likely that the property will become a shipper before the latter part of the season of 1912.

Just when Corrigan, McKinney & Co. will undertake the development of the Blair and Michaels tracts has not been decided. It is not improbable that the work will be delayed several years. The Corrigan-McKinney Co. controls the Star West mine in the Cascade district of the Marquette range, but for several years it has not operated the property. These operations await the improvement of the ore market and the creation of a larger demand for mineral of the siliceous quality.

This North Lake body of ore that the Cleveland Cliffs Co. is developing, lies in part under a large tamarack swamp and extends under the bed of the lake itself. To provide for the safety of the principal shaft, sunk through a treacherous overburden, it has been necessary to equip it with walls of concrete from the surface to the ledge which caps the deposit.

Considerable expenditures in improvement and development work are being made by the Cleveland Cliffs Co. in the Negaunee field, and even greater investments are being made in the Swanzey district. The Princeton, Austin, Stephenson and Smith are newly opened mines of the Cleveland Cliffs Co. in the latter region, and the Northwestern, Cyr and other properties are being developed or explored. Four concrete shafts have been put down. One of these is at the Northwestern.

At Negaunee, the Cleveland Cliffs Co. is to strengthen its Maas mine shaft. Due to the drawing of the ground in the original sinking the shaft was forced out of perpendicular in places. A concrete lining will be put in, replacing the present timbering, and the shaft will be enlarged. The work will be done this winter.

The United States Steel Corporation, which for 10 years had operated the property, has shipped 200,000 tons of ore from the Hartford mine at Negaunee since its lease expired the first of June. The ore was that which had been stocked on surface, all of which has now been removed. The Hartford is now operated by the Republic Iron & Steel Co., and is known as Cambria No. 2. It is wrought in conjunction with the Cambria and Lillie mines. All of the surface and underground equipment installed by the Steel Corporation was purchased by the Republic Co., and operations have been carried on as briskly as prior to the change of control. With the combined forces at the Cambria, Lillie and Hart-

ford, the Republic Co. is working a large number of men in the Negaunee field.

A shaft house of steel, to replace one of timber, is to be erected at the Steel Corporation's Section Sixteen mine at Ishpeming. The concrete foundation is finished, but work on the superstructure will not be started until after the shipping season, in order not to interfere with mining operations.

The Volunteer Ore Co. is expending a large amount of money in the development and equipment of the mine which it is opening at Palmer lake, in the Cascade district of the Marquette range. Ore is being hoisted and stocked, it being the intention to make no shipments this year, with the possible exception of a sample cargo. The shaft is over 300 ft. deep and the company will soon be mining on several levels. Drifts are now being extended. More than 100 men are on the payroll and the force will be increased as rapidly as additional men can be employed to advantage.

MISSIOURI-KANSAS.

Joplin, Mo.

The Bullfrog mine is taking up a stope at the 190-ft. level. The ore consists of both lead and zinc, the dirt containing about 4% ore. The mill has a capacity of 200 tons. Operations are still conducted through the original shaft, though drifts have been extended for long distances.

The Amalgamated Co., operating at Smelter hill, in the vicinity of the Bull Frog, is hoisting dirt from two shafts for the 300-ton mill and from another shaft for the Blackberry mill, which was taken over by this company more than a year ago. The company formerly operated the Montana mill, which has since been converted into a tailing mill.

The initial turn-in from the new 300-ton mill on the old John Jackson property has been made, and consists of 50 tons of high-grade ore. The new mill is being carefully tried out to be adjusted for the best recovery of the ore.

Pearl Bros. are erecting a 100-ton tailing mill on the Granby land, on the Lone Elm road, and have a contract to handle the tailings from a 340-acre tract, enough to keep them operating for several years if the tailings prove rich enough to work profitably. Because of the inadequate milling practice of early days the present company expects to find the tailing piles rich in zinc ore content.

A tailing plant is also to be operated in the Chitwood camp by Davidson & Co., who formerly operated a plant at the Puritan mine in Gordon hollow.

Drifts have been driven south from the new shaft at the Prairie Chicken mine and have been connected with the old workings. A tramway has been built from the new shaft to the mill. The new shaft entered the ore, which proved as rich as that found in the old workings. The ore is found at the 200-ft. level and runs in high faces rich in zinc ore with almost no lead.

Several leasing companies are sinking shafts on leases on the Granby land on Poor Man's gulch, on drill hole [illegible] Clarke Marshall has [illegible] drill hole showing ore [illegible] A few months ago the turbine and cheap piles were reworked on the Tiffany tailing mill, which was burned down later. Another shaft in the same vicinity is being sunk by O. L. Brake on a drill hole which showed ore slightly below the 80-ft. level.

Webb City, Mo.

Preparations are being made to reopen some of the old mines in the North Webb City district. A new company has taken over the Electric mine on the Guinn land and will begin operations at once. This is a thin sheet ground run. The ore occurs above the 200-ft. level.

Another property to resume is the Hoddom mine, under the management of the American-Canadian Co., after a temporary shut down. The new company has drained the workings by new pumps to the 175-ft. level, where the ore occurs.

Operations have been resumed at the Siegfried mine on a lease of the Newell Morse land. It will be taken over by the Providence Co. This dirt is also thin sheet ore but is extensive. The ore occurs at 175 ft.

A company composed of Joplin men has taken over the Porter tract in Carthage, just west of the Missouri Pacific depot and is installing large pumps. A derrick and other equipment are being added to make immediate mining possible.

Carl Junction, Mo.

Mining activity is noticeable in the Carl Junction camp where preparations are being made to build new mills and open properties on a more extensive scale. The Homestake Co. has for weeks been prospecting and opening up a lease on the land of the Jubilee Co. with a view to thorough development before erecting a mill. The ore has been well opened from 80 to 100 ft., and drifting has been extensive, disclosing 10 or 12 faces of ore. The company is planning for the immediate erection of a mill. The land is practically virgin territory. Some rich ore has been taken out in the preliminary work.

Gager & Co. are new producers in this camp since the draining of the ground by the United Zinc Co. The drifts of the Gager mine are cut up to the boundary line of the United Zinc Co., where rich ore has been found. The new company is making a good turn in each week on hand ugs.

Another producing mine in this camp is that of Wright Bros., on a lease from the Jubilee Co. Free ore of high grade is found at 80 ft. in soft ground which requires heavy timbering.

Spring City, Mo.

The Mary E. mine, which was first opened by Arthur Smith and C. S. Bank and later abandoned or to other operators, has developed into a good producer of zinc ore in a well ground run. The equipment [illegible] consists of 2 cars [illegible] and 1 [illegible] blende. A large [illegible] contract [illegible] been [illegible] mine.

Another new mill has been placed in the camp in Crandall & Lee on the site of the old Dobson mine. The mine has been steadily developed by the new owners since taking it over, and it has proved one of the best producers of lead and calamine in the camp.

The shaft being sunk by Arthur Smith on his drill hole on the Craycroft land is down 50 ft. The shaft is unusually large and its sinking is slow. The ore was encountered in a hole near the shaft at a depth of 180 ft.

The county road between Newton and Jasper counties seems to be a dividing line for calamine and zinc blende-producing ground. North of the line the main ore is zinc while to the south are extensive calamine producing mines. Rice & Co. have a calamine proposition on the I. B. Jones land, where the equipment is small and the turn-ins though small, are regular. Further to the east is another calamine property on the Baker land, operated by a small company. An 8-ft face of calamine just above the limestone bed rock is being uncovered. Plans are being made to thoroughly develop this prospect.

Galena, Kas.

Morris, Gentle and others have taken over the old Oliphant lease on the Southside land and will develop it as soon as the ground is sufficiently drained by the Playter pump.

M. J. and Frank Pickett are hoisting dirt which will run 20% ore. About 90 tons of mill dirt per week are being hoisted.

Joe Fahlenbach, manager for the Clermont Co., south of Shoal creek, is planning developments to the 300-ft. level, providing the drill holes show ore to that depth. The ground has already been well tested to 248 ft. and several holes have showed the deposit to 300 ft., but not in sufficient quantities to warrant sinking the shaft without a further test.

The old Lawton camp in Kansas, the most northwestern of the district, is again to be active, the pumps having already been started for draining. The water proposition is especially difficult owing to the great distance from other operating camps. Power is furnished by the Empire Co., and a centrifugal pump has been installed.

MONTANA.

Butte.

There seems to be no doubt but that a basis of agreement has been reached between representatives of the North Butte and Tuolumne Mining companies, but just the nature of this agreement it is impossible to ascertain. There were, it is said, two propositions under consideration, one to take the Tuolumne property over on a basis of one share of North Butte for seven of Tuolumne and the other to concede a certain portion of the ground in dispute to the Tuolumne Co.

It is reported that the Butte-Ballaklava Co. is going to make a hard fight in the suit brought by the Anaconda Copper Mining Co. which is now set for hearing on Dec. 12. J. V. Percival, secretary of the company, has arrived in the city to make preparations for carrying on the fight and he has brought with him Walter Harvey Weed, who is mak-

ing a thorough examination of the ground in dispute and will be the principal witness on behalf of the company.

The interests of W. A. Clark have been so curtailed in this district in the past few months through the sale of the mines and reduction works to the Amalgamated Copper Co., that he feels that he no longer requires the services of a general manager and A. H. Wethey, who has occupied that position for many years, retires on the first day of the new year. The rumor has again been revived that negotiations are again proceeding between the Amalgamated Co. and Mr. Clark for the sale of the street railway together with Columbia gardens, which is part of the street railway system.

The Butte & Superior Co. is reported to have made $25,000 during October. The result of the bond issue is still unknown, but there is an impression that so far it has not been a success. A short time ago it was stated that an experimental shipment of 1000 tons of ore had been sent to the Clark concentrator and that on the returns received depended a deal of some kind whereby Mr. Clark would decide whether he would invest any of his surplus in the bond issue. There is an unofficial statement that the experimental shipment did not come up to expectations—in fact it is stated that the returns were not nearly as satisfactory as those received from the Basin concentrator.

The reported rich strike on the 1300-ft. level in the East Butte, seems to fully justify all the reports which have been sent out. Mining men are highly gratified that satisfactory financial arrangements have been made with the Pittsmont Co., whereby the indebtedness will be carried over for another year.

Dr. J. S. Marshall of Durand, Mich., has organized a mining company to work some claims on Ogden mountain, in the Big Blackfoot country and which has proved rich in gold. For a number of years development work has been carried on in a limited way until recently when some very rich veins were encountered. Dr. Marshall has a controlling interest in the newly formed company and it has been decided to erect a 10-stamp mill at once to crush the ore from the leads that have already been developed. Work is to be rushed on the mill and in a few weeks it should be in operation.

Marysville.

S. S. Fowler, of Nelson, B. C., has had a force under W. H. Wright working on the Ball Butte tailings, which show good values in gold.

The Jay Gould mine on Canyon creek, 20 miles from here, is running its mill of 40 stamps on two shifts and working a force of 25 men on one shift. Thirty-five to 40 tons is the daily run. Bullion is shipped out regularly. Owen Burns is general manager. Stewart Mason is assayer and mining engineer.

Basin.

The Basin Reduction Works is experiencing some trouble just now as a result of the $145,000 which is claimed by the State savings bank as long overdue on a note. The sheriff of Jefferson county has attached the mill site of the company, water rights and improvements and the following mining claims: Katie, Kissing Bug, Canyon placer and Klondyke placer. The suit was brought to recover on a note for the amount stated, dated March 1, 1907, with interest at the rate of 8% from Nov. 1, 1909. The note was signed by the president and treasurer of the Basin Co.

Corbin.

John Hoy, manager of the Corbin Metal Mining Co., states that the directors of the company may decide to build a concentrator in the near future to handle the ore which is being blocked out. He says that the work of developing the property is going on in a satisfactory manner. The ore averages 10% lead, 6 ozs. of silver and about 2½% silver. Mr. Hoy says that a crosscut has been run from the station of the 500-ft. level, a distance of 110 ft. intersecting the south vein and the lead has been drifted upon for a distance of about 50 ft., showing up some excellent values in silver, lead and copper.

Toston.

The Black Friday group which was developed and worked prior to 1884 was taken over under lease and bond by the present owners in 1909, who went to work to prospect the old workings retimbered the main shaft and sank it to 300 ft. and opened up a drift and found a body of ore. They sank the shaft 400 ft. and drifted from that 900 ft. and got ore from 740 ft. of the drift, which was 8 ft. wide. They then opened up stopes, and took out considerable ore. This ore is now being shipped to East Helena. The company was reorganized, and eight claims were added, giving the company 143 acres of mineral ground. Some of the claims were bought and others located. This mine is producing $1000 a day in gold, according to the statement of Williard Bennet, president of the company. The Black Friday mine is located 12 miles from here, in the Radersburg mining district. The development consists of an incline shaft down 500 ft., following the vein with levels every 100 ft., and the shaft is equipped with steel track and an automatic skip, a boarding with bunk house, blacksmith shop, oil house, coal bin, cabins for heads of departments and a house for superintendent and his family. John Sucetti is superintendent. Forty-five men are employed on two shifts. An air compressor and air drills, furnished by Western Supply Co., Butte, have just been installed. The company is preparing to install electric power, which will be used independently of the present steam power. There is blocked out ready to break 10,000 tons in the stopes. The vein averages 5 ft. between walls. The sampling at smelter for the Black Friday Co. is handled by Goodall Bros., assayers, of Helena, Williard Bennet, Helena, president; A. B. Bennet, manager and treasurer. The Black Friday Gold Mining Co. is a close corporation owned by Attorney General Galen of Montana, and the Bennets.

NEVADA.

Ely.

Thomas F. Cole, president of the Giroux Con. Mines Co., and James A. Snedaker, director and consulting engineer for the same corporation, recently inspected the Giroux property. Since August the new steel head frame, 94 ft. in height, has been erected and is now in use. Two pumps, one of a capacity of 1200 gals. per minute and the other of a capacity of 600 gals. per minute, have been lowered in sections to the station at the 1200-ft. level of the new shaft and are being assembled so as to be ready for service next month. The surface power plant will probably go into commission by the first of the year. Mr. Cole stated that the Giroux Co. will soon erect a smelting and reduction plant in the Ely district. He wishes first, however, to test the Alpha ores between the 1200 and 1400-ft. levels and for that purpose the new Giroux shaft will be carried on downward as rapidly as possible from its present depth of a little over 1200 ft. to the 1400-ft. level, from which a crosscut will be driven to catch the Alpha ore body. At present, the old workings of the Alpha are being retimbered and extended at the 1000-ft. level and much rich ore is being taken out in the course of development work.

A. D. Meyers, of Goldfield, who is the principal owner of the Ely Calumet property, located directly north of the town of Ely, has started a 2-compartment shaft on the company's Grand Deposit claim. A considerable amount of high-grade copper ore has been shipped by lessees from shallow workings on the Ely Calumet property.

M. M. Johnson, of Salt Lake City, chief mining engineer for Samuel Newhouse, of Utah, is expected to soon arrive in Ely to make an examination of the Ely Centennial property, in which Mr. Newhouse is interested. The Ely Centennial people recently encountered 2 ft. of ore going high in copper in a drift from their main tunnel.

The Zack shaft of the Ely Con. Co. has broken into sulphide ore at the 460-ft. level. The management believes that the permanent sulphide zone has been encountered. A new pump and another boiler have been purchased to add to the equipment at the Zack shaft.

Local stockholders of the Ely Central Copper Co. are much disatisfied with the plan of the new management to reorganize the company and levy an assessment of 25 cts. a share. It is estimated that over 200,000 shares of Ely Central stock are held in the Ely district. A movement is on foot to pool the stock which is held locally and to employ counsel to prevent the carrying out of the plans of the reorganization committee who, it is claimed, are employes of George Graham Rice and B. H. Scheftels & Co., who, it is believed, are trying to secure control of the new company.

The Giroux Con. Mines Co. has filed suit before the Interstate Commerce Commission to establish through rates and joint rates from Chicago and Missouri river points and Denver and Pueblo, Colo., covering all classes and commod-

ities of freight moving to points on the Nevada Northern railroad, which runs from Ely to connect with the Southern Pacific at Cobre. The Nevada Northern is the only railroad running into the Ely district and its high rates have been a great drawback to the Giroux and every other company operating in the district with the exception of the Nevada Con. Co., which controls the road.

Rhyolite.

The first clean-up has been made at the Eclipse mill in the Bullfrog district. The run is said to have been satisfactory, several hundred tons of ore having been treated. The mill has a capacity of 40 tons daily. Work is now suspended awaiting ore. The Eclipse Co. has prepared the following schedule of charges based on an extraction of 90% of the values: 300 tons or over per month, $6.50; 100 to 300 tons per month, $7; 25 to 100 tons per month, $7.50; under 25 tons per month, $8. These rates apply to ore ranging up to $50 per ton in value. Special contracts will be made for ore running over $50. The above tonnage need not be delivered all at once but can be brought in small lots throughout the month, and milling charges will be based on total tonnage delivered during the month.

Manhattan.

Operations have been resumed at the mill of the Nevada Reduction Co., formerly known as the Lemon mill, under the management of C. L. Logue.

A strike of high-grade ore has been made on the April Fool property, being operated under lease by William Crasp. Drifting since the strike shows the vein to be gaining in width. Two feet of shipping ore is exposed, some of it showing coarse gold.

Tonopah.

Ore shipments from the Tonopah camp for the week ending Nov. 12, were as follows: Tonopah Co., 3300 tons; Belmont, 1700 tons; Montana-Tonopah, 1052 tons; MacNamara, 200 tons; West End, 350 tons; Tonopah Extension, 980 tons; Midway, 50 tons, making a total for the week of 7632 tons having an estimated value of $190,800.

The MacNamara Mining Co. is still shipping high-grade milling ore to the Western Ore Purchasing Co., but it is thought that the smelters will soon be able to handle the regular output of the mine.

At the Tonopah-Belmont operations continue to be confined to the development of the Belmont vein on the various levels. The Belmont shaft is being sunk below the 1100-ft. level. Except in the shaft, all work is in ore.

Winnemucca.

Development work on the property of the Intermountain Metal Co. is extracting and shipping ore from a depth of 300 ft. The vein is said to be at least 3 ft. wide. A small force of miners is being worked at present. The shaft has a depth of 400 ft.

Charles Keller, of Dutch Flat, has sold his property, known as the Bodenio group, in the Dutch Flat district, to J. H. Causten, of National. There are said to be

property.

Eldorado.

ton custom concentrator and stamp mill, including a cyanide plant, which will be

Nelson smelter. The company will make a specialty of treating custom ores. John Taylor is general manager for the company.

The Eagle Co. has let a contract to sink from the 400 to the 600-ft. level. The raise has been completed as has also the straightening of the old shaft. It is understood that the company will later install a 40-ton milling plant to treat its ores.

The Stedbar-Ax Co. is reported to have acquired the 20-stamp mill and millsite formerly owned by O. A. Ellis, the machinery for which is on the ground. This company is developing water in Copper canyon, which will be piped to the mill in Eagle wash, below the old Morning Star mine. It is the company's purpose to treat custom ore by a system of coarse concentration. The company expects to have its plant in operation in 90 days. It will have a daily capacity of about 80 tons.

Lida.

At Pigon Springs, 11 miles west of here, the Lida Queen is working about 20 men. The mill is working 24 hours per day on good ore and the mine is looking well. The ore body runs about $20.

At the Big Blue mine, situated about 14 miles west of here, a body of good ore has been struck in doing assessment work. It carries gold and silver. This property is owned by Michigan people, and it is understood they will soon put a force of men to work.

Beard Bros. and others are taking out good copper ore, not far from the Big Blue mine. This ore runs well in gold and silver. They are shipping to Goldfield. The second shipment went out on Nov. 10, and ran about $90 in gold, silver and copper.

The Calumet & Nevada at Lida, will work a small force of men this winter and in the spring will install machinery.

NEW MEXICO.

Silver City.

The Chemung Mining Co. has struck a large body of high-grade ore on its property at Tyrone.

In the Pinos Altos district, 9 miles west of Silver City, James O'Hara, who has taken over an option on the Alaskan group of claims, has 2 car loads of high-grade ore ready for shipment. He expects to make regular shipments to El Paso. He has cleared the 125-ft. shaft of water and debris and expects to continue work steadily.

[illegible] the Pinos Altos district. This mine is owned by the Big Lode Mining Co. Efforts are being made to extinguish the blaze, which is destroying the timbering in the drift [illegible]

[illegible] the Central district. Manuel Taylor is in charge of the property. William Finlay, of Muskogee, Okla. is general superintendent.

The machinery for Cleveland & Weatherhead, who are operating the Deadwood mines, is arriving and is being delivered to the mines.

The Oakes Co. is reported to have made a strike of ore carrying black sulphides with high values in gold and silver, on the McKinley mine, in the Cooney district.

Mogollon.

The drill on the Fulkner claim of the Savanna Copper Co. recently passed through 136 ft. of ore that runs from 3 to 10% copper. The average is given as 5½%. The property lies south of the Chemung and east of the properties of the Burro Mountain Copper Co.

Good progress is being made in sinking the main shaft on the Socorro mines. High-grade milling ore is still being found in developments in the new ore body encountered. During October 3600 tons of ore was milled. Regular shipments of bullion and concentrates are being made.

Some good milling ore is being produced in two of the old stopes in the Treasure Mining & Reduction Co.'s mine. The crew will be increased as soon as power facilities will permit.

A rich strike is reported in the Confidence mine, owned by the Helen Mining Co. Operations were recently resumed at this property and since then a large amount of mining machinery has been installed. R. T. Root is in charge.

The newly organized Gold Dust Mines Co. has let contracts for the erection of necessary mine buildings. Development work will be pushed with a large crew of men. A good showing is reported on this property.

Las Cruces.

The first shipment of high-grade ore has been made from the Philadelphia group of mines in the Organ district. The ore carries lead and silver and came from a promising 4-ft. vein recently discovered.

OREGON.

Sumpter.

Work has been resumed at the Morgan Bow mine in the Cable Cove section. The property consists of three full claims and a fraction located on the head waters of the John Day river. A tunnel 500 ft. long has been driven to develop the vein, and on this 250 ft. is in ore. The vein averages from 4 to 5 ft. wide, with from [illegible] in high-grade sulphide ore. The tunnel now gives a depth of 150 ft., but new [illegible] will open the ledge to a depth of 300 ft.

The Dixie Meadows Mining Co. has purchased the Dixie Meadows mine, near Prairie City, Grant county, for $75,000 cash. The company is incorporated for $500,000. The officers are W. H. Ferry, of New York, president, Alexander Konta, of New York, vice-president. The board of directors also includes F. W. Schoefeld, of Sumpter, and E. Hothorn, of New York. Manager I. A. Greenley is arranging to carry on extensive development work during the winter. A

mill will be erected as soon as arrangements for it can be made.

According to the annual report of the Highland Mines Co., there was shipped from the Highland mine during the past 3 months, 555 tons of crude ore having an average value of $44.50 per ton. In addition to this there is about 50 tons of ore in the sampling works at Baker City.

It is reported that a syndicate has bonded the Rainbow mine in Mormon basin, near Baker City, for $1,050,000. Under the provisions of the bond the purchasers are given 4 months in which to make an examination and report, and if satisfactory a cash payment of $250,000 is to be made.

At the Bennet creek placers, near Greenhorn, a tunnel is being dug through the ridge into the placer ground. Drifting will be done and the gravel washed.

The Cougar mines, of the Cougar Mining & Milling Co., near Baker City, have been purchased by Ed. Sanders and associates for $275,000 cash. It is said that developments on the property show ore in sight to the value of $500,000. The main ore shoot has a length of 500 ft. and an average width of from 4 to 16 ft. The values run from $14 to $16.

SOUTH DAKOTA.

Deadwood.

At the annual meeting of the Rochford-Wyoming Oil Co. held at Rochford, Pennington county, the following officers were chosen: Smith Willey, of Deadwood, president and general manager; G. P. Billups, of Rochford, vice-president; E. B. Deffenbaugh, of Rochford, secretary, and J. W. Lapp, of Rochford, treasurer. These with Frederick Swanson form the board of directors. The company has sunk a dozen wells, none deeper than 400 ft., and proposes to commence sinking its first deep well about Dec. 1. All the holes are just over the border line in Wyoming and oil has been struck in each one. The company owns 140 acres of ground and believes that it will be necessary to sink about 1000 ft. before a flowing well is encountered.

J. S. Ford, secretary of the Gilt-Edge-Maid Gold Mining Co., is in Chicago going over plans for a proposed smelter near the property in the Turner district, just east of here. There is plenty of tungue ore in the district

The 300-ft. level of the Iron Hill property in the Carbonate district, has been uncovered by the Black Hills Development & Financial Corporation and the 400-ft. level will soon be put in shape for operations. The shaft on the Home Run claim is down 50 ft. and shows quantities of high-grade ore practically from the surface.

Placer-mining operations now in progress by the Castle Creek Hydraulic Placer Mining Co., near Mystic, Pennington county, are attracting attention for the reason that this is the first instance where dredge work has been done in Black Hills placer work. A force of men is now setting up a dredge which will be operated by electric power and it is hoped to have the dredge operating by early spring. W. S. Noyes, from San Francisco, is in charge of the work. The property lies along Castle creek and takes in nearly 400 acres. The dredge, which is costing about $100,000, will have a capacity of 70,000 cu. yds. per month, the bed rock being found at an average depth of 30 ft.

In the Caliboga district, George Hughes is obtaining some fine ore from the Yellow Jacket claim, which he is working. His shaft is now down 50 ft. and he is working a quartz gouge that yields well in gold, silver and lead, the principal value being in gold.

Work on the new mill of the Hymalulu Mining Co., near Mystic, is being completed and Superintendent Bennett expects to have the plant in operation by the first of the year. The mill is a 5-stamp, steam-operated affair and planned for fine grinding. Much of the gold is free.

The Hidden Treasure Mining Co. is to resume operations on its property near Lead. An air pipe line has been laid to the flourine prospect recently encountered and partially opened up and air drills are to be installed for the development work.

UTAH.

Salt Lake.

The first contract for sinking the shaft on the Crown Point property, in the Tintic district has been finished and the shaft is now at a depth of 105 ft. A second contract has been let for continuing the sinking to the 200-ft. level.

A drift is being run from the 500-ft. level at the No. 3 workings of the Iron Blossom mine, in Tintic district, to get below the cave recently opened. The drift will have to be driven 100 ft. The cave has been found to contain considerable ore, but none of it will be extracted until it can be taken out through the drift on the 500-ft. level.

Col. C. E. Loose, manager of the Gold Chain group of claims, in Tintic district, has completed the installation of an air compressor. In addition to this, some heavy equipment has been installed, and the management is now prepared for greater activity. The showing is satisfactory and within a short time regular shipments will be made to the valley smelter. The principal work is now being confined to two drifts on the 3d and 4th levels, where good ore bodies are being developed. The values are in gold, silver and copper, with the yellow metal values predominating. The product is of a good shipping grade.

The Eureka-Comstock Mining Co. is being organized to take over a group of 6 claims between Eureka and Homansville. These claims adjoin the North Colorado on the north. The capitalization consists of 1,000,000 shares at 10 cts. par. The incorporators are James H Larsen, J. S. and Ross M. Bonny. Developments consist of three small prospect tunnels and a 50-ft. shaft. This shaft is being retimbered and preparations are being made to sink it 500 ft. Vein matter carrying some values shows in the shaft.

It is reported that two new strikes have recently been made on the property of the Utah-Apex Co. One strike of copper and silver-lead ore was made in south branch of the Parvenu tunnel. After drifting about 30 ft. a body of silver-lead ore was encountered. The last 15 or 20 ft. is reported to have been in solid ore. A good showing of copper ore was also discovered in the raise from the No. 7 level. Both strikes are a considerable distance below the present workings, that in the Parvenu being 750 ft. lower, and that in the No. 7 level being 400 ft. lower. On the recommendation of E. P. Jennings, consulting engineer for the company, mining and milling operations will be discontinued for several months and attention concentrated on development work. First-class ore only will be shipped, in order that the compressor capacity may be concentrated on development work.

The Howell Mining Co., which recently acquired and consolidated the Baby McKee mine and the property of the Park City Mines & Power Co., in the south fork of Cottonwood canyon, has run a tunnel into the Baby McKee property, on which all of its development work is now being concentrated, for a distance of 300 ft. and has crosscut this to the north and south on the fissure. One of the cuts on the fissure has been run 200 ft. and for this entire distance the ore has been found ranging in width from 10 ins. to 5 ft. The ore is still in the face and is improving in quality and increasing in quantity. This ore runs as high as 600 ozs. in silver, and 75% lead. The low-grade ore averages not less than 34 ozs. silver and 15% lead. The crosscut running south on the same fissure has opened up a new body of ore 2 ft. wide at the point encountered, but has not been developed sufficiently to indicate its proportions or its values. The ore has the same general appearance as that in the north face. The company is shipping 25 tons a day and working 15 men. The shipments can be increased as quickly as added facilities for handling the ore are installed. One man working alone has been able to break down enough ore to keep six teams busy. The ore is hauled to Murray, a distance of 25 miles.

The Promontory Mining Co. has levied an assessment of ¼ ct. per share to carry its shaft, now down 50 ft., to the 100-ft. point on a promising vein. The ore encountered in the shaft and other workings on the Promontory shows values in copper, silver, lead and gold. Some of it runs from 3% to as high as 15% copper. High-grade lead has been encountered, and all run well in gold. The Promontory Mining Co.'s territory embraces 11 claims, situated on the east side of Promontory mountain, and 6½ miles from Promontory Point station. B. D. Siegfus is president. The other officers of the company are Thomas W. James, vice-president; L. W. Phillips, secretary, together with W. Pow and Eugene Parkes, directors.

WASHINGTON.

Orient.

At the annual stockholders' meeting of the Blue Grass Mining Co., held re-

cently, the following officers were elected: J. J. Noel, president; Dr. G. G. Ede, vice-president, and A. A. Macdonald, secretary and treasurer. These with G. A. Dahl, Geo. S. Bryant, and W. J. Gilpin, form the board of directors.

A small force of men has been put to work on the Beecher mine to clean out the 56 ft. of muck which has accumulated in the shaft. This muck covers the vein where it is supposed to run high and where the samples containing free gold were taken out. Two years ago a car of ore was shipped from this property that averaged about $50 per ton and the surface showings indicate a large body of this ore. The property has since been tied up in litigation and a suit for $2000 for supplies and labor is now pending.

The Orient Gold Mines, Ltd., has just completed a set of buildings at the White Elephant group, in the Little Giant camp, and will commence development work at once.

A strike of ore has been made on the Railroad group, owned by the Summit Mining Co., and situated on the Ferry county side of the Kettle river, 2 miles from Laurier. The property has always been considered low grade, carrying iron ore valued chiefly as a flux. Assays from the new find are said to have shown $19.25 and $12.86, mostly in copper. The last mentioned carried 5% lead. The ore body is said to be large.

The report that the Little Giant property had been sold to the Canadian-Mine Operators, Ltd., of Vancouver, B. C., is denied by one of the principal stockholders of the owning company—the Domingo Mining Co.

At the annual meeting of the stockholders of the First Thought Extension Gold Mining Co., recently held in Orient, the following directors were elected: Dr. C. M. Kingston, H. E. Wooland and N. S. Ross, of Grand Forks, B. C.; A. McArthur, of Moscow, Idaho, Nels Laplant of Marcus and J. M. Ross of Orient. Dr. Kingston was elected president, Mr. McArthur, vice-president and J. M. Ross, secretary and treasurer. Work at the mine will be continued with B. N. Sharp as superintendent.

Drifting with day and night shifts is being done on an ore vein at the 300-ft. level on the Copper-Butte mine on Lion mountain. The ore is said to be rich in gold with the values more evenly distributed than is generally the case with this class of ore. As work has progressed in this drift the gold values have increased to $55.40 in gold and 1 oz. in silver. At times two classes of ore are encountered in the working. One carries in excess of iron and a little copper, carries in spots a good percentage of copper, but the ore which contains little mineral, but carries the gold, seems to predominate. The Copper-Butte is equipped with an air compressor, two 5-inch machine drills, and a gasoline hoist and pump.

The new cyanide mill at the Napoleon mine is expected to be ready for operation at an early date. It is equipped with 10 stamps and has a capacity of 125 tons a day. The mill will be run by steam power.

Republic.

The work of breaking ground for the new [illegible] mill has been started and it is expected that the Knox Water Power Co. will have its new dam on the Republic side [illegible] be built [illegible] be removed.

Rossland.

[illegible] Co., Ltd., has been organized to work the Shockem, Copper Mining Co. and Rocker. The company has been operating for the past 8 years and the property has just reached the producing stage. The company's liabilities amount to about $20,000 and assets outside of the mine itself are given at $75,000. The company's main office is in Philadelphia.

Conconully.

An important strike is reported to have been made at a depth of 300 ft. on the Peacock property of 12 ft. of concentrating ore and 10 ft. or more that shows high values in silver, lead and gold. Active development is under way.

Spokane.

Reports from Loon Lake state that a discovery of tungsten ore was made recently on the Fred Pindall lease, 2000 ft. west of the Blue Grouse property. This discovery extends the tungsten belt to a total length of 2 miles.

Active operations are being maintained on the Tungsten King mine, about 11 miles from Deer Park, and adjoining the Blue Grouse. A tunnel is now in 420 ft. but it is not expected to cut the formation at less than 600 ft. of depth. The ore is practically the same that was encountered on the top of the mountain, where a shaft was sunk to a depth of 85 ft. Returns from samples of three grades of rock were as follows: 68% tungstic acid. F. E. Hoskins is secretary and general manager.

Judge Voyet Vliet of Spokane, has gained possession of the Cathedral Peak tungsten property near Oroville. The [illegible] certain percentage of the earnings of the [illegible] mill.

WISCONSIN.

[illegible] filled with little

Republic.

[illegible] developments at the Kentucky mine have brought it to the [illegible] producing capacity and better than a ton of high grade is now [illegible] The Melly mine [illegible] head, is also turning out [illegible] of high grade ore which is being shipped to the Joplin Separator Works, at [illegible] Ill.

A big strike was recently made at the Cleveland mine, in a drift from the mouth of the shaft, where a [illegible] of fine ore in fissure formation was broken into. Preparations are under way for the erection of a large concentrating establishment.

Benton.

The Redhawk Mining Co. is equipping with new machinery and in the past 60 days reports sales of lead ore amounting to nearly $10,000. The mill [illegible] built upon the Harker lands east of the old Pittsburg-Benton mine will be set to work upon a big stock pile. The Shaffer Mining Co., operating upon the P. B. claim, has ready for shipment 90 tons of fine concentrates and 15 tons of lead ore.

The Drumm mine is shipping regularly 3 cars of ore each week that averages as high as 45% zinc, which is all sold to the Grasselli Chemical Co. The Locke Lawler at New Diggings, on the Mineral farm, is making a high recovery of ore. The ore is being carried to Shullsburg on the Northwestern railway.

The Wisconsin Zinc Co. proposes to equip the Winskill mine with power and milling plant complete. The Excelsior Mining Co. has secured a lease on the McCabe lands, east of the Dimmick farm, and a drill machine has been put to work prospecting the allotment.

CANADA.

BRITISH COLUMBIA.

Nelson.

The management of the Lucky Jim Zinc Mines, Ltd., has purchased a 6-drill Rand air compressor and drilling plant, which is now being taken into the mine upon Three Forks. Active development will be carried on at the property, and the profit will be [illegible] operations depends to the extent [illegible] of the ore bodies may be [illegible] the ore will [illegible] Lucky Jim [illegible] The stockholders [illegible] $1,000,000. [illegible] Three Forks [illegible]

Development will be pushed [illegible] Company owns about [illegible] contract was awarded [illegible] sunk for the work. [illegible] A. P. Patterson [illegible] Other [illegible] The [illegible] Mining Co. [illegible] Work is now [illegible] being [illegible] the [illegible]

The Silver Peak [illegible] Nelson [illegible] recently [illegible] at the mine and [illegible]

on a larger scale than has been the case during the past 4 years, under the control of Thos. Gough and associates. There is now ore in the stopes that will yield a net profit of over $155,000, and while this was being blocked out the mine and mill has more than paid its own way. During the past year about 10,500 tons of ore has been put through the mill and the net profits have been in the neighborhood of $26,000. For the 3 years ending Dec. 31, 1910, the mill has treated 22,012 tons, returning in gross figures $155,000.

The shipments of ore and concentrate from the Slocan-Kootenay district for the week ending Nov. 12, and for the year to that date, also showing local milling operations, were as follows:

Mines.	Week Nov. 12. Tons.	Year to Nov. 12. Tons.
Aurora	19	19
Eastmount	30	649
Emerald	51	1,646
Hope	28	295
Idaho	12	103
Panama	37	55
Queen (concentrate)	15	741
Richmond-Eureka	91	3,885
St. Eugene (concentrate)	185	12,373
Standard	96	1,450
Sullivan	128	18,525
Yankee Girl	172	1,662
District Mills.		
Granite-Poorman	250	10,500
Hedley G. Mg. Co.	1,000	39,385
Highland	250	8,500
Le Roi 2, Ltd.	300	13,500
Nugget	110	5,000
Queen	120	18,500
St. Eugene	3,000	125,000
Wilcox	75	900

Greenwood.

The Boundary Mining & Exploration Co. recently shipped its first car of coal from its mine near Midway. Work is being pushed on the two seams on the property. Buildings are being erected on the property recently acquired on Myers creek, 9 miles from Midway, by a local syndicate. A government analysis of the coal of this locality showed 69% fixed carbon and 8% ash.

The Greenwood smelter of the British Columbia Copper Co. is now producing copper at the rate of 1,000,000 lbs. per month, and gold and silver valued at $75,000.

The Nickle Plate mine of the Hedley Gold Mining Co. is producing about 4500 tons of ore per month, of an average value of $12.18. This is treated in the company's 40-stamp mill, giving an average recovery of $11.25. The costs per ton amount to $5.47 and the profit per ton runs on an average $5.78. Up to the present time the company has treated approximately 39,385 tons.

The shipments of ore from the Boundary district for the week ending Nov. 12, and for the year to that date, were as follows:

Mines.	Week Nov. 12. Tons.	Year to Nov. 12. Tons.
Granby Mines	1[illegible]	96,112
Jackpot	30	17,974
Mother Lode	7,160	313,734
Number Seven	75	540
Rawhide	2,700	19,100
Snowshoe	2,900	151,944

Rossland.

The Le Roi has resumed shipments, recently sending a small tonnage to the Trail smelter. The future operations of this mine cannot yet be determined.

The shipments of ore and concentrate from this district for the week ending Nov. 12 and for the year to that date were as follows:

Mines.	Week Nov. 12. Tons.	Year to Nov. 12. Tons.
Centre Star group	3,740	164,044
Le Roi 2, Ltd. (part conc.)	597	26,370
Le Roi	120	12,417
Nickel Plate	69	716

ONTARIO.

Cobalt.

To date from the O'Brien mill, which is now treating 120 tons a day, 14 bullion shipments have been made, worth $153,028.49. From the latest returns the extraction is running 93.4% from heads varying between 27 and 34 ozs. to the ton.

For the 9 months ended Oct. 31, the profit shows in a statement just issued by the Temiskaming, as $579,364.30. The profits for the quarter were $284,762.93, or at the rate of $94,920.98 per month.

The Beaver Con. states that at the end of October it had $30,000 cash on hand, $30,000 due from the smelter, and a $30,000 car ready to ship.

A lease has been taken on the Green Meehan Con. property by Buffalo men for 5 years. The lease stipulates that 120 ft. of development underground shall be done the first year, 200 ft. second year, 225 ft. the third year, 250 ft. the fourth year and 275 ft. the fifth year.

Surface prospecting for the season of 1910 on the Nipissing resulted in the discovery of three veins in the conglomerate formation and 11 in the Keewatin. The three veins in the conglomerate all showed high-grade ore, and six of those in the Keewatin. The summary of the surface conditions on Nov. 1, showed that of the Nipissing's 846 acres, 488 had been partly prospected and 358 totally unprospected. Upon one vein only of those discovered during the year is work being done.

During the month of September, Nipissing produced 351,849 ozs., having a value of $185,219. No. 73 vein, known as the Meyer, is now yielding rich ore and for a distance of over 200 ft., shows a width of from 4 to 6 ins., of 2500-oz. ore.

The Crown Reserve is to start work again in the north shaft of the Silver Leaf. It is now drifting on what is believed to be a continuation of the Victoria vein of the Crown Reserve. It is 4 ins. wide and assays 20 ozs. on the Silver Leaf side of the line.

Porcupine.

On the Miller Middleton properties of the Timmins, two shafts sunk 27 and 34 ft. respectively shows that the good values go down at least that far. The "Blue" vein at that depth is from 3 to 4 ft. wide. A winze is being sunk at the 100-ft. level of No. 1 shaft, 60 ft. north of the shaft and is down 30 ft. on the vein, gold showing all the way down.

The six McPharland properties, situated between the Dome and the Rea mines in Porcupine, have been sold to a syndicate of New York people. Assessment work has shown up seven veins, one of which is 8 ft. wide and pans gold freely.

Before the lakes and waterways of the Porcupine country were declared exempt from staking, an English syndicate staked Pearl lake near the Timmins and Simpson lake near the Foster. It is now preparing to sink shafts to develop under the lakes.

MEXICO.

Mexico City.

Paris bankers will within a few months assemble a cash fund of 400,000 pesos, available on demand and subject to call, for the installation of heavy mechanical equipment for development of the El Oro properties of the Descubridora Mining Co., of Mexico City, whose possessions lie adjoining those of the Mexico Mines of El Oro. To carry out this plan the French interests will increase the capitalization of the Descubridora Mining Co. from 360,000 pesos to 1,000,000 pesos. After deducting from this additional capitalization of 640,000 pesos the 400,000 pesos to be devoted to permanent improvements and exploitation on the Descubridora the Paris investors will retain the balance, 240,000 pesos, as their remuneration for financing the deal. Representatives of the foreign operators submitted a detailed proposition, of which the foregoing is a summary, to a special meeting of Descubridora stockholders at the Mexico City offices and the shareholders named four of their directors, M. P. Phipps, J. W. Gelling, Dr. C. Homer Woodruff and E. Schuh, a committee empowered with full authority to negotiate with the French envoys and to close the deal. The reorganized company will be of Mexican incorporation, and its board of directors will reside in Mexico City. At the completion of the reorganization, whose principal effect will be the increasing of the capital, each stockholder of record in the present Descubridora Co. will receive a par value of stock of the new issue equal to his present holdings. According to the terms of the proposition made, the Parisians must deposit in this city 10,000 pesos within 15 days to bind the bargain and hold their option and this sum will be forfeited to the Descubridora Co. in the event of the transaction's falling through. After the deposit of the 10,000 pesos forfeit has been made the outside capitalists will be allowed 3 months for thorough inspection and sampling of the diggings and a more detailed mapping out of their tentative plan of campaign, at the expiration of which period the transaction must be finally closed or called off. The great advantage to the Descubridora Co. will be a more rapid and economical development of its claims. This company is now able to spend only about 4000 pesos per month in exploration, whereas the innovation contemplated will provide funds for the purchase of machinery, employment of as many miners as the workings can possibly accommodate and operations upon a system which will work a great saving in fuel, other expenses and time. The latest assay from the Descubridora received at the Mexico City offices shows an average value of 12 lbs. silver and 22 gms. gold per ton across the 18-in. pay streak being followed in the winze that is dropping on the so-called Descubridora vein from the crosscut driven on the 731-ft.

level. The winze has reached a depth of 19½ ft. and the latest assay, therefore, came from a vertical depth of about 750 ft. At that point the lode appears to be both widening and increasing in metal contents.

SONORA.

Cananea.

Overtures are at present being made toward the sale of the stock of the Espiritu Santo Gold-Silver Co. to a new corporation to be organized for the purpose, which will be a reorganization of the company. A special meeting of the stockholders of the company will be held in Bisbee, Ariz., on Nov. 26, at which time action will be taken in the matter. The Espiritu Santo Co. has now acquired full title to its mining properties after several years of litigation. For the original purchase of the property, the legal costs during the litigation and other incidental expenses, the entire issue of the 40,000 shares has been used. The property is now awaiting development. There is no money in the treasury and there are no means of raising the necessary funds without increasing the capital through some plan of reorganization. The plan adopted by the directors and which will be voted upon at the special meeting is as follows: To sell the entire assets of the company, consisting of the entire capital stock of the Mexican corporation, La Ventura Mining Co., S. A., which company holds the titles to the property, to a third party who will be in effect a trustee, for 20,000 shares of the capital stock of the new company to be organized. The new corporation is to have an authorized capital of $500,000 divided into 50,000 shares, the present stockholders to receive one share of the new stock at the par value of $10 for two shares of the Espiritu Santo Co., at a par value of $2.50. James H. Kirk of Cananea will act as trustee. The property of the company is located near Arizpe, close to the Chispas mine.

The Cananea-Boston Co. has ceased work in its No. 1 shaft and is giving all its attention to the Reeves shaft, which has reached a depth of 85 ft., with good indications. There is a quantity of ore in the shaft.

No. 1 shaft of the Juanita Mining Co. has reached a depth of 110 ft. The bottom is still in leached material with stringers of copper. No. 2 shaft is down 50 ft. and considerable zinc and lead have been encountered.

J. J. Holman, of the San Salvador property, reports that the shaft is down 80 ft. The galena ore which was recently encountered has been passed through and the shaft is now bottomed in an oxidized ore which runs fairly high in silver. The galena was encountered at a depth of 35 ft. and went down to the 70-ft. level where it ran into the oxides. Considerable water is now being made. Twenty-five tons of lead is now on the dump and about 15 tons of oxides has been raised. The property adjoins the Alacran of the Arizpe Mines Corporation, about 19 miles southeast of Cananea.

A 10-stamp mill is being erected at the Esmeralda mine of the Victoria Min[illegible] Co., at La Colorada. The mill is being erected and as soon as completed the ore in the dump will be treated.

A. M. Conard, manager of the Sonora Copper Co., which is erecting a smelter at Noria, states that the plant will be ready for [illegible] 1911.

The Sonora Verde mine, owned by Philadelphia [illegible] and located in the Sierra Azul mountains, is at present being developed by a force under Luckenmen are employed under the supervision of Ernest H[illegible]. The shaft is being sunk on a 10-ft. ledge containing gold and copper values.

A strike was recently made at the Amelia mine of the Mexican Metals Co., located 26 miles west of Cuitaca. At a depth of 260 ft. the shaft entered a body of ore which gave an assay of 4% copper and 10 ozs. in silver.

The Mexican-American Smelting & Refining Co., which will soon blow in the Guaymas smelter, is contracting for gold, silver and lead ores. The company offers to pay cash upon delivery in Guaymas.

A large force of men is employed at El Triunfo mine upon work on the new smelter, which will soon be blown in, and in the mines of the company.

The Montezo shaft on the Santa Fe Con Co. is showing up well in its 200 ft. level. Considerable silver lead ore has been opened up.

At the Rosales mine, located in Sonora, south of Douglas, Ariz., a vein has been opened up for over 70 ft., which averages 18 ins. in width. Assays on samples average $90 in silver and copper. Between $20,000 and $30,000 worth of ore has been blocked out and shipments will be begun in the near future.

JALISCO.

Guadalajara.

From 2 to 3 tons of concentrates a day is being produced at the small plant of the Almoloya Mining Co., owning the Vimoloya copper diggings in Amora district of this state, and it has been decided by the management to later increase the mill's capacity next year. The concentrates running well in copper, silver and gold are expected to the San Luis smelter and large additional bodies of rich ore are being opened up at a vertical depth of 250 ft. by [illegible] exploration, the main tunnel on the lead having a projected length of 520 ft.

In the Arguis district is a 200-ton mill of the Mineral Arteca Copper Co., upon which properties an average of 300 men are employed and upon which production works $100,000 gold worth of improvements will be made in the immediate future. The company is shipping daily about 30 tons of concentrates to the Aguascalientes smelter. The report has the extension of the Mexican [illegible].

El Lajo Mining Co., whose estate is at San Sebastian, is installing a 10-stamp hydraulic plant to [illegible] operations on a new [illegible] recently [illegible] by the company. [illegible] Co. is operating [illegible] gold at the Piedras & Bolsas mine, [illegible] the Old Mexico Smelting Mine & Smelter Co., recently organized by J. E. Landon, of St. Louis, and G. E. Miller, of Denver, with whom is associated R. L. Hernandez, of Zapotlan. The latter has properties in the Jalisco camps of Etzatlan, Tapalpa and Zapotlan. Ore running as high as [illegible] gold, 15 per cent lead and 8% copper is reported [illegible] where there is no railroad facilities. A smelter in commission.

A [illegible] the Santa Fe Consolidated group of [illegible] lead claims in the Santa Fe district, [illegible] by the Ohio Mining & Milling Co., controlled by New York interests. The [illegible] In the mine drifts have been extended for 1100 ft. along the vein.

The newly remodeled and enlarged concentrating plant of the Corona Copper Co., in the Ayutla district, is treating about 70 tons of ore daily, of which there is a large natural [illegible] available for smelting reduction. With the installation of a steam hoist at the company's San Felipe shaft it will be possible to deliver to the mill 100 tons a day. Were once the Corona custom smelter will be blown in for the accommodation of the company's ores and products from nearby mines.

El Favor Mining Co., operating El Favor group in the Hostotipaquillo district, will soon be handling 120 tons daily at its new reduction works, to which there will be added two tube mills, complementing the equipment of two tube mills, 20 stamps, four tubes for regrinding and a cyanide mines already in service. The works will be run by electricity. A large tonnage of ore awaits the completion of the reduction works and the advent of electrical energy.

At the Preciado mine in the Tayoda region, this state, near the Guadalajara-Colima branch of the National Railways of Mexico, is a fissure in sandstone where there is exposed by one 122-ft. tunnel a 3-ft. shoot of shipping gold ore. Wire silver characterizes the product at other points.

St. Paul people, headed by C. D. O'Brien, Jr., have succeeded Patrick Fitzgerald in control of the Zuloaga mine, in the San Marcos de Bolaños camp, where there is a substantial tonnage of milling ore in sight. Thirty years ago this property, which is hardly scratched, shipped to Swansea, Wales, ore that went high in silver and gold.

Ore from the diggings of the Espuela Mines Co., in Hostotipaquillo district, will henceforth be treated at the mill of the Virginia & Mexico Mine & Smelter Corporation, to which an aerial tramway will be connecting the Espuela offerings by March of next year. The Espuela is controlled by a corporation, at the head of which is A. J. Vick, of San Antonio, Texas. The company will shortly build its own reduction plant of 200 tons' capacity.

CHIHUAHUA.

Chihuahua.

The Yaqui Development Co. has [illegible] from the Wm. Chalmers

Co. machinery sufficient for doubling the present capacity of its concentration plant located at Yoquivo, reached from Cuesta Grecian on the line of the Mexico North-western railway.

Operations have been indefinitely suspended at the Barcionera mine in the Sta. Eulalia camp. This is one of the holdings of the J. S. Qualey & Co., which concern is operating in several localities in this state.

La Fe Mining & Milling Co., of which M. W. Lafayette is manager, is adding five stamps and other equipment to its mill so that when plans are carried out the mill will have a capacity of about 50 tons daily. The property is at Guadalupe y Calvo.

La Alianza mine, situated about 7 miles from Chihuahua, is daily marketing at the local smelter about 40 tons of gold-silver ore.

Recent bullion shipments passing through Chihuahua banks include the following: Batopilas Mining Co., 69 bars of silver of value of 80,000 pesos, and Ignacio Ramirez, of Batopilas, 1 bar of silver worth about 2000 pesos.

HIDALGO.

Pachuca.

The La Cruz Mining Co., of Zimapan, in the northern part of the state, was organized last May with the object of reworking the property, which had been drowned out about the year 1830, at which time it was being worked by an English company. From that time until the present company was formed several attempts have been made to set things going, but without success, the large flow of water so far baffling all efforts to cope with it, although a good adit level is driven connecting with the neighboring Toliman gulch. Considerable other development work was carried by the old company, the shaft is lined with masonry. The property is known to contain high-grade ore. The new company will install powerful pumps, which will drain the mine and enable it to sink and carry out development work necessary. The offices of the company are at Mexico City, Calle de Colon. The capital is $230,000, divided into shares of $10 each, par value. There are no free shares. The board of directors is as follows: Miguel Taboada, president; Joaquin Morales y Cervantes, vice-president, and Hedley Ludlow, with Enrique Valle y Camtre as comisario.

An extraordinary general meeting of the shareholders of the Santa Inez Carretera Co., of Pachuca, is called for Nov. 25, in Mexico City, to consider the alteration of certain articles of the document of incorporation and statutes of the company, and also receive report of [illegible] matters of the time. Good progress is reported in the development [illegible] and sinking of the new [illegible]. The contractors are Harper & Mercado. Connection has been made to the Mexican Light & Power Co. and the electric hoist and motor are operating regularly. The depth, so far, is the shaft is now 58 meters and sinking [illegible] returned. It is now expected to have the shaft down according to contract, that is, 250 meters by February next. The contract also, includes all timbering needed in the shaft. The mine is favorably situated and directly in the course of the lodes which have proved highly productive in the Santa Gertrudis, La Blanca and Barron mines.

Santa Gertrudis Co., of Actopan, has taken an option on the San Salvador mine of the same district. Good values have been obtained although only comparatively little development work has been done. The property is close to the La Cruz Actopan Co., from which ore of good value is being regularly shipped. A shaft has been sunk 24 meters and a lode opened up, showing 2½ meters in width with an assay averaging 3½ kgms. silver and 30 gms. gold. Other small veins have also been cut showing values of 22 kgms. silver. A local company has denounced the land lying to the north and will immediately proceed to develop the property in order if possible to cut the same lode. The Santa Gertrudis Co., of Actopan, is now making arrangements for getting the properties into working order. Jose Hermosillo & Co., of Pachuca, are the local representatives.

GUANAJUATO.

Guanajuato.

The La Tula Mining Co., of La Tula, the manager of which company is Mr. W. H. Puffer, is erecting a new stamp mill to handle the ore from its mine. The entire property will be operated by electric motors. For the past 2 years the company has operated a double-drum hoist by a 55 hp motor. The new installation consists of some 10 motors, in all totaling with the present equipment between 300 and 400 hp. The new motors will drive rock breakers, belt conveyors, stamps, classifiers, tube mills, and a number of pumps as well as air compressors. A new mine pump is also being installed which is of the Goulds make and has a capacity of 100 gals. per minute at 1000-ft. head. The electrical equipment is of the Westinghouse Electric & Mfg. Co.'s make and is being supplied by G. & O. Braniff, of Mexico City.

OAXACA.

Oaxaca

Local licensed engineers, together with some of the principal mine owners, have petitioned the department of Fomento, to extend the period given by the new mining law in which to put up the new style of mining monuments. The law stipulates that this must be done by the end of the current year, and the petitioners ask for an additional 6 months, alleging inability on their part to complete the work within the required time, owing to the very large number of claims, and the limited number of engineers. It is not possible to say what answer will be given by the department, though generally such requests receive favorable action.

SOUTH AFRICA.

Johannesburg.

The Natal coal trade is recovering, for, during the month of September, the total output reached 199,379 tons, of which no less than 132,816 tons was shipped at Durban. The average production per person employed for the month was 20 tons, as against 19 tons a year ago, when the total output was 154,736. The slight improvement is attributed to the growing use of coal cutters underground.

The Swaziland Tin, Ltd., reports profits for the year amounting to £13,656, all obtained from its Swaziland concessions, the Zaaiplaats property, north of the Transvaal, not having come up to expectations. These Swaziland tin deposits are alluvial in character, no lode denoting their origin has yet been discovered, but they occur over extensive areas and will keep the company at work for a considerable time. Lately, hydraulicking operations on a large scale have been introduced and steps are being taken to extend these operations.

The gold output for the whole of the Transvaal, for the month of September, was declared by the Chamber of Mines as 646,899 ozs., all of which, save 25,588 ozs., came from the Rand. Stamps employed numbered 9711, an increase of 56 as compared with August, while tube mills have increased by four, being 186 in September. The average daily output was valued at £28,339, which is better than for any of the last 12 months. The East Rand Proprietary Mines are still well ahead in the list, with an output of 61,266 ozs.; next come the Crown mines, with 52,359 ozs.; Ranafontein South, 31,367 ozs.; Robinson mine, 26,322 ozs.; Geldenhuis Deep, 23,840 ozs.; Simmer & Jack, 20,412 ozs.; Rose Deep, 19,497 ozs.; Nourse Mines, 19,122 ozs.; Village Main, 18,302 ozs.; Langlaate Estate, 17,309 ozs.; Robinson Deep, 16,365 ozs.; Ferreira Deep, 16,295 ozs. These were the 12 principal producers.

The Ranafontein Estates have started opening up the Government series of reefs and the prospects are reported as encouraging. These Government reefs lie to the north of the Main reef series and nowhere on the Rand are they being worked and milled, although their existence has been known for a long time. At best, however, their values must be uncertain and judging from the values disclosed elsewhere the Ranafontein Estates have the best prospects of turning the Government reefs to good account.

The Transvaal Gold Mining Estates own a large area in the Lydenburg district and during the past year have increased their average monthly profits from £10,000 to £20,000. Operations are carried out on a peculiar deposit quite distinct from that worked either on the Rand or at Barberton and the prospects of the company are bright.

The Western Rand Estates have commenced the sinking of their circular shafts beyond Ranafontein, their diameter being about 18 ft., and the present depth, 80 ft. The ground is expected to be heavily watered, so much so that the shafts will have to be lined with Hamel & Leng's tubbing. A pumping plant has also been provided up to a capacity of 5000 gals. per minute. The depth of the reef is expected to be about 1700 ft.

Corporation Affairs and Reports of Companies.

The stock of the United Verde Extension Mining Co. has been listed on the Boston curb.

With the final payment made last month of the original purchase price of $17,000 the Peoche Con. Mining & Reduction Co. wound up its business and passed into history, its place being taken by the Consolidated Peoche Mines Co. and the Nevada-Utah

Julius A. Lewisohn, Alvin Untermeyer, J. H. Sussman and N. Bruce McKelvie have resigned as directors of Ray Central Copper Co., and Jonas Ries and J. P. Hervey were elected directors. Meyer Schamberg was elected president in the place of Julius A. Lewisohn and J. Bradley Cummings was elected vice-president in place of W. E. Sharpe.

The stockholders of the Ely Central Copper Co. are asked to contribute 25 cts. a share and exchange their stock for shares in the Ely Central Development Co., of Delaware, with 2,500,000 shares, par $5. The secretary says the company's bonded debt does not exceed $55,000, while other debts amount to $20,000. Should each of the 1,000,000 outstanding shares of the Ely Central Copper Co. pay the assessment levied, it would place $100,000 in the hands of the management.

The Rio Plata Mining Co., with offices in New York, has been chartered under Mexican laws; its subsidiary, the Compania Minera Rio Plata, will go out of existence. The mine operated by the company is in Chihuahua, Mexico, 85 miles from the Kansas City, Mexico & Orient railway. The output, amounting to about 85,000 ozs. of silver a month, is carried by mules to Sanchez, the nearest railway station. The company is capitalized at $2,000,000, upon which quarterly dividends are paid at the rate of 8% a year

A decree has been issued authorizing the sale of the property of the National Mining Exploration Co. during the last week in February, 1911, either at Boston or in Arizona. According to the decree the proceeds from the sale of the property, which is located in the Globe and Lone Star districts of Arizona, are to be paid to the New England Trust Co. in the settlement of all claims against the company. The decree expressly provides for the payment of the $100,000 note of Nathan L. Amster of Brookline, which is secured by a mortgage or deed of trust for $250,000 held by the Liberty Trust C

Albert F. Bigelow, George A. Yeo, and Chas. G. Bancroft, who were appointed to appraise the real and personal property of the National Mining Exploration Co., have filed their report. They estimate the value of the nine claims in the Globe mining district at $150,000. The Fumarole claims in the Lone Star mining district as uncertain. Personal property is placed at $2577. Value of 12,587 shares of company's stock is placed at [illegible] per share. Company's books show that $218,868 has been expended on

The information herewith is published gratuitously for the benefit of subscribers who may be shareholders in mining and metallurgical companies. Secretaries are invited to send copies of reports, etc.

[illegible] $1,273,964 [illegible] the Lone Star dis[illegible] the old Globe [illegible]

At the annual [illegible] the Newhouse Mines & Smelting Co. Samuel Newhouse became president in charge of the negotiations of L. A. Kramer, one of the [illegible] Lone Star [illegible] Kramer was elected [illegible] Newhouse Mines & Smelting Co. Mr. Schirmer was on the reorganization committee, and his election as director on the new company was with the permission that he would hold office for the 12 months. Mr. Newhouse, during [illegible] the largest stockholder in the new company, has up to the present been officially connected with the corp[illegible]

Official Reports.

THE APEX MINING CO.

The report of the Utah Apex Mining Co. for the eight months ending Sept. 1 follows:

ASSETS.

		1909.
[illegible]	$ [illegible]	$ [illegible]
North Utah Mines	1,000	1,000
Phoenix Mining Co.	[illegible]	[illegible]
Phoenix Mfg.	[illegible]	[illegible]
Equipment	[illegible]	60,752
[illegible]	60,000	39,543
Supplies	1,543	1,543
Development	611,[illegible]	567,[illegible]
Cost of production	297,[illegible]	[illegible],023
Total	[illegible]	$2,748,280

LIABILITIES.

Capital stock	$1,000,000	$ 1,000,000
Bonds	500,000	500,000
Notes payable	20,000	
Account [illegible]	[illegible]	[illegible],[illegible]
Profit and loss	[illegible],[illegible]	248,280
[illegible]	[illegible]	$2,748,280

INCOME ACCOUNT.

Receipts	
[illegible] Aug. 1, 1910	$ [illegible]
Net [illegible]	193,[illegible]
Note [illegible]	20,000
Total	$194,591
Expenditures	
[illegible] Mortgage [illegible]	$ 23,250
[illegible] Mfg.	31,[illegible]
[illegible]	3,[illegible]
[illegible]	4,[illegible]
[illegible]	11,[illegible]
[illegible]	2,500
[illegible]	1,500
[illegible]	[illegible]
	$[illegible]
[illegible]	[illegible]
	$[illegible]

[illegible]

[illegible]	$[illegible]
[illegible]	[illegible]
	28,[illegible]
	$ 81,00[illegible]

NEVADA WONDER MINING CO.

The report of the Nevada Wonder Mining Co. for the year ending Sept. 30, 1910 shows net profits of $190,486, compared with $84,[illegible] in previous year and $88,[illegible] in year ended Aug. 31, 1908. The balance sheet as of Aug. 31, 1910 is as follows:

ASSETS.

Mines	$ [illegible]
Mines [illegible]	[illegible]
[illegible]	[illegible]
Water rights and pipe lines	61,691.18
Mill construction account	[illegible]
Machinery, engines and wagons	[illegible]
Horses, etc.	[illegible]
Accounts receivable	2,790.21
Wonder Ext. Mining Co. stock 167,180 shares	8,[illegible]
Stock invested in property	[illegible]
Cash on hand	[illegible]
	$[illegible]

LIABILITIES.

Capital stock	$1,500,000.00
Bills payable	[illegible]
Advances on and [illegible] of subscriptions to bonds with interest	[illegible]
	$1,652,201.15
Balance profit and loss	459,739.67
	$ 111,940.8[illegible]

The income account [illegible] the treasurer for year ending Sept. 30, 1910 follows:

RECEIPTS.

Cash on hand Oct. 1, 1909	$ [illegible]	
Advances on and [illegible] of subscriptions to bonds	[illegible]	
Miscellaneous receipts	$16.00	$[illegible]

PAYMENTS.

Expenses Nevada Wonder	$ [illegible]
Legal [illegible]	[illegible]
Mortgage and [illegible]	[illegible]
Accounts payable [illegible]	[illegible]
Dividends paid [illegible]	[illegible]
Horse Creek [illegible]	[illegible]
General expenses	[illegible]
Mill construction account	[illegible]
Bonds	[illegible]
Miscellaneous expenses	[illegible]
	$[illegible]
Balance [illegible] Sept. 30	[illegible]
	$[illegible]

Latest Ore and Metal Market Reports and Prices.

Silver.—For the 10 months ending with October the movement of silver in and out of the country does not show any marked improvement on account of the higher price of bar silver during the past two months. The London quotation of bars at this time is around 25⅞, a slight recession from the earlier prices at the best of the month. The excess of exports for 10 months was $9,381,854. This is less than that of 1909, when the excess was $10,053,622. But it is slightly better than that of 1908 of $8,620,328. The current year is, therefore, likely to be about an average year, so far as net exports go. To the end of October total exports were $46,034,318, compared with imports of $36,652,464.

Improved prices in bar silver have probably come largely out of older stocks. The inflow of silver to the United States from Mexico and Canada leaves on the average a margin for exports of about $1,000,000 a month. One of the largest lines of demand occurs through exports by way of San Francisco. Early in November a single shipment of $525,000 was made thence to Hong Kong. The influx of the metal to China has been liberal within recent months, but mainly from the London market, whose chief point of replenishing is the American mines. There is no sign of congestion or of scarcity in the domestic market, which regularly has a moderate margin for exports over imports.

Quotations per fine ounce at New York and standard once, 0.825, at London, for the week ending Nov. 22, were as follows:

	New York Cents	London Pence
Nov. 17	55½	25 5-8
" 18	55⅝	25 9/16
" 19	55⅝	25 1/2
" 21	55¼	25 1/2
" 22	55	25 9/16

MONTHLY AVERAGE PRICES OF SILVER.

Month	New York, Fine Oz.				London, Standard Oz.	
	1910			1909	1910	1909
	High	Low	Avg	Avg.	Avg.	Avg.
Jan.	52⅝	52	52.380	51.781c	24.162	23.883
Feb.	52⅛	50½	51.534	51.466	23.804	23.571
Mar.	52⅛	50⅜	51.466	50.388	23.700	23.333
April.	54⅛	53¾	53.186	51.475	24.463	23.652
May.	54⅜	53½	53.881	52.921	24.739	24.304
June.	53⅞	53¾	53.671	52.596	24.629	24.166
July	56⅛	53¾	54.05	51.038	25.017	23.483
Aug.	53⅝	52	52.907	51.120	24.408	23.587½
Sept.	54	52½	53.322	51.430	24.588	23.694
Oct.	56⅞	53¾	55.540	50.919	25.605	23.506
Nov.	.....	.....	.....	50.630	.....	23.355
Dec.	.....	.....	.....	52.289	.....	24.03
Year	.....	.....	.....	51.503	.....	24.180

Difference in domestic and foreign prices is explained by the fact that the New York quotations are per fine ounce, the London per standard ounce 0.925 fine.

Copper.—Looked at from all angles the copper situation is exceptionally good and the outlook for the producers is better than it has been for several years. Prices in the New York market held firm during last week, and indications point to the fact that there has been quite a satisfactory amount of buying by consumers. The large electrical goods manufacturers have reported an improved demand for their products and are said to have been in the market for larger quantities of wire. The brass makers are also good buyers at this time of the year, owing to the holiday demand for their products. It is believed that the consumption of copper is larger than the production and that from now on the output of the refineries will be nearer that of the mines. This will result in substantial monthly reductions in the surplus, and by the time the agreement to curtail production expires next July, it is probable that there will be nothing left but a normal supply. While it is evidently the desire of the larger producers not to interfere with consumption by making rapid advances, there is a strong feeling that the price will advance gradually and go considerably above the 13-ct. figure for electrolytic. At the close of last week the market was very dull, with no opportunity for export business on the present basis of prices. During the week ended Nov. 17 the exports were 9555 tons, making the total exports so far this month 17,495 tons.

Quotations for copper per pound at New York and per long ton of 2240 lbs at London for the week ending Nov. 22 were:

	Lake	Elec.	Cast.	Standard London
Nov. 17	13–13⅜	12⅞–13	12½–⅝	£57 12 6
" 18	13–13⅜	12⅞–13	12½–⅝	57 12 6
" 19	13–13⅜	12⅞–13	12½–⅝	57 12 6
" 21	13–13⅜	12⅞–13	12½–⅝	57 17 6
" 22	13–13⅜	12⅞–13	12½–⅝	57 16 3

MONTHLY AVERAGE PRICES OF COPPER.

New York—Lake Copper.

Month	1910			1909
	High	Low	Average	Average
January	14	13⅝	13.850	14.309c
February	13¾	13½	13.710	13.440
March	13⅞	13¾	13.801	12.910
April	13½	12½	13.062	12.940
May	13	12½	12.772	13.301
June	13	12⅜	12.807	13.536
July	12¾	12⅜	12.755	13.374
August	13	12⅜	12.881	13.305
September	13	12⅜	12.898	13.948
October	13	12⅝	12.830	13.074
November	.....	.....	.....	13.270
December	.....	.....	.....	13.646
Year	.....	.....	.....	13.337

New York—Electrolytic Copper

Month	1910			1909
	High	Low	Average	Average
January	13⅝	13½	13.630	13.9
February	13⅝	13¾	13.448	13.045
March	13⅝	13	13.350	12.451
April	13¼	12⅝	12.843	12.570
May	12⅞	12½	12.617	12.819
June	12⅞	12⅜	12.260	13.233
July	12⅝	12¼	12.420	12.914
August	12⅝	12½	12.620	13.010
September	12⅝	12⅜	12.570	12.347
October	12⅝	12⅝	12.730	12.740
November	.....	.....	.....	13.057
December	.....	.....	.....	13.500
Year	.....	.....	.....	12.965

Quotations for electrolytic cathodes are 0.125 cent per lb. less than for cakes, ingots and wire bars.

New York—Casting Copper.

Month	New York			London	
	1910			1910	1909
	High	Low	Average	Average	Average
January	13⅝	13¼	13.417	60.356	61.246
February	13½	13	13.230	59.390	57.838
March	13¾	12⅞	13.189	59.226	56.380
April	13	12¾	12.8874	57.125	57.350
May	12½	12⅝	12.367	56.312	59.305
June	12½	12⅜	12.329	55.346	59.696
July	12⅜	12⅛	12.205	54.127	58.579
August	12½	12⅜	12.351	55.785	59.386
September	12½	12⅛	12.307	55.192	59.020
October	12⅝	12⅜	12.535	56.937	57.547
November	.....	.....	.....	.....	58.000
December	.....	.....	.....	.....	59.228
Year	.....	.....	.....	.....	58.685

Tin.—The close of last week showed a very dull and weak tin market. Business was practically at a standstill, consumers staying out of the market and speculators showing practically no interest in the situation. Early in the week futures were taken up by the London corner, and as stocks are pretty well concentrated in New York, the market closely followed the London fluctuations. This was followed by sharp declines both on Thursday and Friday. It is believed that the foreign syndicate, which is in control of supplies, will manipulate the market to serve its interests for some time. It is generally believed in the trade that American deliveries this month will be very small, probably less than the total arrivals. Arrivals since Nov. 1 have been 2194 tons and the amount afloat is 1565 tons.

Quotations per pound at New York and per long ton at London for the week ending Nov. 22 were:

	New York	London
Nov. 17	36.55—36.60	£166 10 0—166 12 6
" 18	36.35—36.35	166 0 0—166 0 0
" 19	36.25—36.35	166 0 0—166 0 0
" 21	36.80—36.95	167 17 6—167 17 6
" 22	36.70—36.90	167 10 0—167 10 0

MONTHLY AVERAGE PRICES OF TIN, NEW YORK.

Month	1910			1909
	High	Low	Average	Average
January	33.375	32.00	32.616	28.907c
February	33.40	32.20	32.829	28.286
March	33.75	31.40	32.365	28.908
April	33.43	32.25	32.959	29.371
May	33.45	32.50	33.107	29.085
June	33.50	32.40	32.67	29.307
July	34.00	32.25	32.904	29.009
August	36.25	32.95	34.046	29.943
September	36.10	34.25	35.114	30.897
October	38.00	34.20	36.411	30.665
November	.....	.....	.....	31.794
December	.....	.....	.....	32.677
Year	.....	.....	.....	29.436

Lead.—The lead market at New York was higher and more active at the end of the week, following the advance made by the American Smelting & Refining Co. to 4.40@4.50.

New York and London quotations for the week ending Nov. 22 were as follows:

	New York Cts. per Lb.	London Per Ton
Nov. 17	4.40—4.50	£13 6 3
" 18	4.45—4.50	13 3 9
" 19	4.45—4.50	13 3 9
" 21	4.45—4.55	13 8 9
" 22	4.45—4.55	13 3 9

MONTHLY AVERAGE PRICES OF LEAD.

Month	New York				London	
	1910			1909	1909	1909
	High	Low	Avg.	Average	Avg.	Avg.
January	4.72½	4.70	4.698	4.184c	13.818	£13.133
February	4.72½	4.40	4.637	4.031	13.345	13.833
March	4.70	4.40	4.536	4.013	13.197	13.586
April	4.60	4.35	4.400	4.167	13.645	13.333
May	4.25	4.50	4.370	4.310	12.612	13.891
June	4.50	4.35	4.454	4.300	12.616	13.096
July	4.55	4.35	4.451	4.342	12.596	13.530
August	4.60	4.32½	4.451	4.313	12.362	13.861
September	4.50	4.31½	4.416	4.346	12.708	12.750
October	4.55	4.40	4.448	4.354	13.070	13.379
November	.....	.....	.....	4.395	.....	13.053
December	.....	.....	.....	4.548	.....	13.093
Year	.....	.....	.....	4.275	.....	13.077

Prices in the Missouri-Kansas district last week advanced to $56 per ton, due to the heavy purchase of the new lead smelter at Webb City. Shipments were small.

MONTHLY AVERAGE PRICES OF JOPLIN LEAD ORE

Month	1910			1909
	High	Low	Average	Average
Jan	$60.00	$58.00	$58.85	$52.81
Feb	56.00	53.00	54.00	51.85
March	58.00	55.00	58.35	49.37
April	60.00	56.00	56.00	54.00
May	50.00	48.00	48.87½	56.45
June	49.00	49.00	49.00	56.31½
July	49.00	49.00	49.00	56.19
August	55.00	49.00	50.50	59.00
Sept	56.50	53.00	55.40	56.87½
Oct	56.00	52.00	53.62½	58.00
Nov				55.63¾
Dec				54.50
Year				54.778

Zinc.—Zinc ore prices last week again advanced in the Missouri-Kansas district, reaching a $48 base for a few lots of high grade ore. The greater part of the tonnage of high-grade ore, however, sold on a $47.50 base. The high price reported was $51.

MONTHLY AVERAGE PRICES OF JOPLIN ZINC ORE

Month	1910			1909
	High	Low	Average	Average
January	$52.00	$42 50	$48 18¾	$42.07
February	48.00	36.00	42 06¾	36.56
March	49.00	42.50	45 06¾	36.35
April	47.00	36.00	43.56¾	40.30
May	46.00	38.00	42.18¾	40.72½
June	46.00	37 00	42.12½	43.75
July	44.00	36.00	41.10	44.85
August	45.00	36.00	41 75	48.62½
September	49.00	39.00	44.40	48.75
October	48.00	41.00	44.62½	50.55
November				52 68¾
December				52.00
Year				44.717

Spelter.—The spelter markets were steady at the close of last week. Quotations at New York and London for the week ending Nov. 22 were as follows:

	New York Cts. per Lb.	London Per Ton
Nov. 17	5.85 – 5.95	£24 2 6
" 18	5.85 – 5.95	24 2 6
" 19	5.85 – 5.95	24 2 6
" 21	5.85 – 5.95	24 2 6
" 22	5.85 – 5.95	24 2 6

MONTHLY AVERAGE PRICES OF SPELTER.

Month	New York				London	
	1910		1909	1910	1909
	High	Low	Avg.	Avg.	Avg.	Avg.
Jan	6.30	6.00	6.177	5.1380	£23.278	£21.344
Feb	6.25	6.30	5.730	4.851	23.210	21.455
Mar	5.90	5.52½	5.668	4.761	23.023	21.634
April	5.65	5.20	5.526	4.954	22.547	21.520
May	5.60	4.95	5.352	5.106	22.018	21.925
June	5.60	5.16	5.188	5.372	22.181	22.465
July	5.60	5.15	5.028	5.387	22.404	21.952
Aug	5.60	5.25	5.295	5.049	22.670	22.075
Sept	5.60	5.35	5.503	5.79	23.177	22.988
Oct	5.85	5.50	5.618	[illegible]	23.880	23.232
Nov				5.372		23.200
Dec				6.213		23.090
Year				4.484		22.068

Shipments of lead, zinc and silicate ores from the Missouri-Kansas field for the week ending Nov. 19, and for the year to that date, were as follows:

LEAD ORE SHIPMENTS

	Week Nov. 19. Lbs.	Jan. 1- Nov. 19. Lbs.
Alba-Neck City		[illegible]
Ash Grove		[illegible]
Aurora	[illegible]	[illegible]
Badger Peacock		[illegible]
Carl Junction		[illegible]
Carthage		[illegible]
Cave Springs		[illegible]
Duenweg	[illegible]	[illegible]
Galena	[illegible]	[illegible]
Granby	[illegible]	[illegible]
Joplin	[illegible]	[illegible]
Miami	[illegible]	[illegible]
Oronogo	[illegible]	[illegible]
Quapaw		[illegible]
Sarcoxie		[illegible]
Seneca		[illegible]
Spurgeon-Spring City	3,550	[illegible]
Stotts City		[illegible]
Webb City-Carterville	[illegible]	[illegible]
Zincite		[illegible]
Total	[illegible]	[illegible]
Value	[illegible]	[illegible]

[illegible] SHIPMENTS

	Week Nov. 19. Lbs.	Jan. 1- Nov. 19. Lbs.
Alba-Neck City		[illegible]
Aurora	196,510	7,17[illegible]
Badger Peacock		[illegible]
Carl Junction		[illegible]
Carthage		[illegible]
Cave Springs		[illegible]
Duenweg		[illegible]
Galena		[illegible]
Granby		[illegible]
Joplin		[illegible]
Miami		[illegible]
Oronogo		[illegible]
Quapaw		[illegible]
Sarcoxie		[illegible]
Seneca		[illegible]
Spurgeon-Spring City		[illegible]
Stotts City		[illegible]
Webb City-Carterville	[illegible]	[illegible]
Zincite	[illegible]	[illegible]
Total	1,111,7[illegible]	[illegible]
Value	$[illegible]	$[illegible]

Quicksilver.—Quicksilver was dull and prices weak at previous range. The price was $33.50 per flask of 76 lbs. in 100 flask lots. In London Rothschild's quotation was £8 and second hand £7 12s 6d.

Tungsten.—Business continued to be reported as fairly active in a jobbing way. Prices were unchanged. Prices per pound in ton lots are as follows: No. 1 pure ingot, 50@51 cts.; rods and wire base price 51 cts., and sheets 42 cts. base price.

Antimony.—The demand was fairly active at unchanged prices. Prices to-day are 7.50 cts. in Cookson's, 7.00@7.25 cts. for Hallett's, and 7.00@7.25 cts. for ordinary brands. The London market is quoted at £20 for Hallett's and £28 for ordinary brands.

Coal Mines.—Supplies seem to be reported as liberal, but the demand was light and confined to jobbing requirements.

[illegible]

German Copper Consumption.—Accord[illegible] to the figures published by L. Vogelstein & Co., New York exporters, the German consumption of refined copper during the month of January, September, 1910, was [illegible] tons, against [illegible] tons in the corresponding period of 1909. The exports during the month of September, 1910, were [illegible] tons, against [illegible] tons in the same month of 1909. The total exports during the nine months of January to September, 1910, were [illegible] tons, against [illegible] tons in the corresponding period of 1909. The total exports during the nine months of January to September, 1910, were [illegible] tons, against [illegible] tons in the corresponding period of 1909. For the above quantities 11,131 tons were imported from the United States.

Prices Current of Minerals, Etc.

Abrasives—			
Carbons, carat		$60.00	to 75.00
Carborundum, powdered, lb			.08
granular, lb		.10	to .17
Corundum		.07	to .10
Emery, Turkish flour, lb		.01½	to .02
Garnet, short tons		30.00	to 50.00
Pumice Stone, powdered, Italian, lb		.01½	to .01¾
lump		.03½	to .30
Acids—Muriatic, 18° to 22° (tank cars)			
	100 lb	1.15	to 1.50
C. P. (carboys)		.06½	to .07½
Nitric, 36° to 42°		.04	to .05
C. P. (carboys)		.07½	to .09½
Sulphuric, 50° to 66°		.01	to .01½
C. P. (carboys)		.06½	to .07½
Alcohol—U. S. P. gal		2.58	to 2.60
Wood, 95%, gal		.51	to .53
Denatured, 1.83 proof, gal		.40	to .43
Alum—Chrome, 100 lb		4.25	to 4.75
Ground, 100 lb		1.85	to 2.25
Lump, 100 lb		1.75	to 1.85
Aluminum—No. 1 Ingot, lb. (ton lots)		.22	to .24
Sulphate com'l, lb		1.50	to 2.00
Ammonia—26°, lb		.04½	to .05
26°, lb		.04½	to .05½
Carbonate, lb		.06	to .08
Antimony—Cookson's, lb		.07	to .08
Hallett's, lb		.07	to .07½
Arsenic—White, lb		.02½	to .02¾
Red		.03½	to .05
Asphaltum—Barbadoes, sh. ton		80.00	to 120.00
California		25.00	to 30.00
Trinidad		20.00	to 30.00
Utah (gilsonite) sh. ton		32.00	to 40.00
West Indies, sh. ton		30.00	to 50.00
Barites—Am. ground prime, sh. ton		12.00	to 16.00
Floated		17.00	to 18.00
Foreign, floated		20.00	to 23.00
Bismuth—Metal, lb., New York		2.10	to 2.15
Bleaching Powder—Domestic or foreign			
bbl		1.62½	to 1.75
Bone Ash, lb		.52	to .54
Borax—(crystals in bbl.) lb		.05½	to .06½
Bromine—lb		.48	to .50
Cadmium (100 lb. lots), lb		.65	to .70
Cement—Portland, Am., bbl		1.60	to 1.70
Foreign, bbl		2.25	to 2.50
Rosendale, bbl			.85
Slag, bbl		.75	to 1.00
Chrome Ore—50%, long ton		14.00	to 16.00
Chrysolite, lb		.05½	to .07
Coke—Connellsville furnace		1.40	to 1.85
Foundry		2.00	to 2.50
Copper Sulphate, (100 lb lots)		6.00	to 6.25
Copperas, bbl		.65	to .85
Cyanide—98 to 99%		.20	to .24
Ferromanganese		40.45	to 40.95
Ferrosilicon		54.50	to 56.50
Ferrovanadium—30% to 40% V per lb. V.			5.00
Fire Clay—St. Louis, (ex. qual.), sh. ton			6.00
St. Louis, (ordinary) sh. ton			5.00
Fluorspar—Domestic lump (long tons)		8.00	to 10.00
Ground		12.00	to 14.00
Foreign Crude			9.50
Fuller's Earth, 100 lb		.50	to .55
Graphite—Dust, lb		.02½	to .03
Lump, lb		.06½	to .10
Large lump, lb		.08½	to .10½
Gypsum—Ground, sh. ton		4.00	to 7.00
Infusorial Earth—Am., lb		.01½	to .02½
German, lb		.04½	to .05½
Iron Ore—Bessemer old range, ton			5.00
Bessemer Mesabi			4.75
Non Bessemer old range			4.50
Non Bessemer Mesabi			4.50
Magnesite—Grecian, crude, 95%, long ton		7.50	to 8.50
Calcined, sh. ton		26.00	to 37.50
Magnesium—(100 lb. lots) lb			1.50
Manganese Dioxide—Foreign			
Crude, powdered, 70 to 85%, lb		.01	to .01
Crude, powdered, 85 to 95%, lb		.01½	to .06
Manganese Ore—80 to 85%, sh. ton		16.00	to 32.50
Mineral Lubricants—			
Black, reduced, 27 gr. zero gal		.15½	to .17
Summer		.11½	to .13
29 gr., 25@30 cold test		.12	to .13½
15 c. t		.12½	to .13
Cylinder, light, filtered, gal		.17½	to .20
extra cold test		.24	to .34½
dark steam		.13½	to .14
Neutral, filtered, lemon, 33@34 gr		.15	to .18
wool grade 30 gr		.13	to .13½
Molybdenite—lb		.25	to .30
Naphtha—New York			
Benzine, 62		.17	to .17½
Gasoline, 86		.28½	to .30½
Naphtha, 75 to 76		.21½	to .23½
Stove Naphtha		.14½	to .19½
Nickel—lb		.40	to .45
Ozokerite, lb		.14	to .17
Petroleum—New York			
Crude bbl., per gal			.11½
Refined, bbl. (jobbing)			.11½
Platinum		39.50	to 41.50
Potassium—Bicarbonate		.07½	to .08½
Bichromate		.07½	to .07½
Carbonate calcined, 80 to 85%		.03½	to .04½
Hydrated, 80 to 85%		.04½	to .04½
Caustic, electrolytic, 90%		.05½	to .06½
Chlorate, crystals		.09½	to .09½
Permanganate, small crystals		.10½	to .19½
Prussiate, yellow		.13	to .13½
Pyrite—Lump, domestic(non arsenical)unit		.11	to .11½
Fines, domestic, (non arsenical)		.10½	to .11
Spanish, domestic, (non-arsenical), lump		.18	to .18½
Spanish, domestic, (non-arsenical), fines		.10½	to .11
Quicksilver—Flask (76 lb.)			33.50
Saltpeter—Crude, lb		.04½	to .04½
Refined		.05½	to .05½
Soda—Ash, 58% (48% basis), in bags		.97½	to .99½
Bicarbonate		1.25	to 1.30
Caustic, 74 to 75% (60% basis)		1.85	to 1.95
Chlorate		.09½	to .10
Hyposulphite, bbl		1.40	to 1.50
Nitrate		2.17½	to 2.20
Phosphate		.02½	to .03½
Prussiate		.04½	to .05½
Sulphur—Domestic, prime, ton		22.00	to 22.50
Roll, 100 lb		1.85	to 2.15
Flour		2.00	to 2.40
Talc—Domestic, sh. tons		12.00	to 20.00
French, sh. tons		15.00	to 25.00
Italian, sh. tons		30.00	to 40.00
Tin—Bichloride, 50%, lb			.11
Crystals, lb		.24½	to .27
Oxide, lb		.40	to .42
Straits		36.25	to 36.75
Tungsten, 60% pure, per unit			7.00
Uranium Oxide, lb		2.20	to 4.25

Capitalization and Dividends of United States Mines and Companies.

Gold, Silver, Copper, Lead, Nickel, Quicksilver and Zinc Companies.

NAME OF COMPANY.		Authorized Capital Stock.	Number Shares Issued	Par Val	Dividends on Issued Capitalization. Paid in 1910.	Total to Date.	Latest, Date.	Amt.
Acacia, g	Colo.	$1,500,000	1,438,989	$1		$115,229	Dec. 20,'09	$0 01
Adams, s l c..	Colo	1,500,000	80,000	10		758,000	Dec. 18,'09	.04
Aetna Con., g	Cal.	500,000	100,000	5		325,000	Apr. 10,'10	.15
Alaska Goldfields	Alaska	1,500,000	250,000	5	687,500	342,500	Jan. 28,'10	.15
Alaska Mexican g.	Alaska	1,000,000	180,000	5	180,000	2,580,381	Aug. 29,'10	.30
Alaska Mines Sec...	U. S.	2,500,000	500,000	5		50,000	Nov. '06	.06
Alaska Trea Invest.	Alaska	5,000,000	200,000	25	250,000	11,135,000	May 28,'10	.50
Alaska United, g	Alaska	1,000,000	180,000	5	81,000	502,680	Aug. 29,'10	.10
Amalgamated, c	Mont	100,000,000	1,578,879	100	2,368,317	62,809,856	Aug. 29,'10	.50
Am. Sm. & R., com	U.S.	50,000,000	500,000	100	2,000,000	12,000,000	Oct. 15,'10	1 00
Am. Sm. & R., pf	U.S.	50,000,000	500,000	100	3,500,000	36,713,053	Oct. 1,'10	1.75
Am. Sm. Sec. A pf	U.S.	17,000,000	170,000	100	765,000	5,525,000	Sept. 1,'10	1.50
Am. Sm. Sec. B pf	U.S..	30,000,000	300,000	100	1,125,000	7,875,000	Sept. 1,'10	1.25
Am. Zinc, L. & Sm.	Mo..	3,750,000	80,250	25	124,480	403,480	Oct. 15,'10	.50
Anaconda, c	Mont	30,000,000	1,200,000	25	2,400,000	47,500,000	Oct. 19,'10	.50
Annie Laurie, g	Utah	5,000,000	25, 0	100		459,564	Apr. '09	.30
Argonaut, g	Cal.	1,000,000	200,000	5		1,130,0 0	Nov. 20,'09	.80
Arizona, c	Ariz.	3,669,300	2,881,165	10	864,064	14, 19,097	Oct. 1,'10	03
Atlantic, c	Mich.	2,500,000	4, 000	25		950,000	Feb. '05	.50
Bagdad Chase, g pf	Cal..	1,0 0 0	81,870	5		292,294	Jan. 15,'09	.10
Bald Butte, g. s.	Idaho	250,000	250,000	1		1,354,648	Oct. 1,'07	.04
Baltic, c	Mich	2,500,000	100,000	25	500,000	6,500,000	Sept.28,'10	5 00
Beck Tunnel Con..	Utah	100,000	1,000,000	0 10		340,000	Oct. 1,'05	.02
Beloit Elmo, l. z	Wis.	1,000,000	80,000	1		8,000	Dec. 5,'09	.05
Benton Mg. & Dev.	Wis.	6,0 0,000	196,667	1		10,949	Nov. 20,'08	.01½
Big Six, s. l	Colo.	500,000	500,0 0	1		20,000	Nov.. '06	00½
Bingham N. Haven	Utah	2,000,000	228,000	5		68,069	Aug. 20,'10	.10
B. & H., l. z	Mo..	400,000	40,0,60	1		44,000	Dec. '05	.01
Boston, q	Cal..	1,000,000	100,000	10		29,000	Apr.. '03	.06
Boston-Sunsumne, c	Utah	750,000	150,000	5	6,0,8	19,500	July 24,'10	.02
Boston & Colo., m	Utah	250,000	15,000	10		492,500	Oct. '02	.75
Bost. & Mont. Con.	Mont	3,750,000	100,000	25	1,000,000	62,625,000	Aug. 15,'10	4 00
Breece, l. s	Colo.	5,000,000	2,0 0,0	25		200,000	June. '05	.05
Brunswick Con., g	Cal..	500,000	500,000	1		13,572	Dec. 20,'09	.03
Buffalo-R-K Cham.	Idaho	1,000,000	100,000	10		2,238,400	July 11,'08	.10
Bullwhacker, c	Mont	1,000,000	450,0 0	1		10,000	July 1,'07	.01
Bunker Hill Con., g	Cal	2,0 0,0	200,000	1	90,0,1	356,000	July 15,'10	.05
Bunker Hill & Sull	Idaho	3,000,000	300,000	10	843,600	12,129,600	Oct. 1,'10	.35
Butte Ballaklava, c	Mont	2,5 0,0 0	250,0	10	125,000	125,0 0	Aug. 1,'13	.50
Butte & Boston, c	Mont.	2,500,000	10, 0,0	25		1,800,000	Feb.. '04	1 00
Butte Coalition, c.	Mont.	15,000,000	1,0,0,000	15	750,000	2,400,000	Sept. 1,'10	.75
Butte Territories, g	Colo...	1,500,000	1,500,00	1		31,250	Oct. '01	00½
Caledonia, l. s. c	Idaho	1,5 0,000	1,500,0,1	1	52,0,0	52,0,0	Jumesa,'10	.01
Caumet & Ariz., c	Ariz.	2,500,000	300,000	10	600,000	11,500,000	Sept.21,'10	1 00
Caumet & Hecla, c	Mich.	2,500,000	100,000	25	2,250,000	112,750,000	Sept.26,'10	7 00
Camp Bird, g	Colo.	5,587,000	899,000	5	539,400	6,346,160	Aug. 15,'10	4 00
Carisa, g. & c	Utah	600,000	600,000	1		60,000	Dec.. '06	.01
Cashier, g	Colo.	1,000,000	900,00	1		26,100	Apr.. '06	.01½
Centennial Eureka	Utah	5,000,000	100,000	25		2,917,,00	Feb. '05	1 00
Center Creek, l. z.	Mo....	1,000,000	100,000	10	20,000	410,000	Oct. 1,'10	.05
Central Eureka, g.	Cal..	400,000	398,1,5	1		29,150	Mar. '05	.05
Century, g. s. l	Utah	150,000	150,0 0	1		39,000	Feb. 15,'0.	.02
Champion, c	Mich.	2,500,000	100,000	25	600,000	5,6 0,000	Oct. 29,'10	1 00
C. K. & N., g	Colo...	1,500,000	1,431,500	1		171,828	Nov.. '04	.01
Cliff, g	Alaska	100,000	100,000	1	8,0,000	80,000	Oct. '10	.15
Clinton, g. s	Colo	100,000	1,0,0	100		60,000	Dec.. '03	.30
Colo. G. Dredging	Colo.	2,0,0,000	100,0 0	10	2,0,0	75,000	July 20,'10	.25
Colorado, s. l	Utah	200,000	1,000,0,0	0 25	240,000	2,270,000	July 20,'10	.06
Columbus Con., g	Utah	1,500,000	285,500	5		242,623	Oct. 15,'07	.20
Cowyn	Idaho	500,000	300,000	1		4,000	Aug.. '06	.01
Combination, g	Nev.	400,000	320,000	1		873,000	Dec.. '06	.15
Cons. Mercur, g	Utah	5,000,000	1,000,000	5		1,180,000	Nov. 15,'09	02½
Consolidated, g	Colo.	2,500,000	2,500,000	1		380,000	Mar.. '02	.01
Cons. RedTopLease	Nev	1,000,000	1,000,000	1		40,000	Feb.28,'09	.02
Cons. St. Gothard, g	Cal..	1,000,000	100,000	10		11,400	Dec. 15,'09	.10
Continental, g	Mo..	750,000	75,000	10		244,000	Oct. 1,'08	.25
Copper Range Con	Mich	40,0,0,000	384,185	100	1,536,740	13,,51,180	Oct. 1,'10	1 00
Corr, l. z	Wis	100,000	50,000	1		5,000	May.. '08	.05
C. & Cripple Ck., g	Colo.	800,000	80,0,0	10		16,000	May.. '02	.02
Creede United, g	Colo.	500,000	500,000	1		187,500	July.. '06	00½
Cripple Creek, g pf	Colo..	125,000	125,000	1		45,000	Jan.. '02	.04
Cripple Ck. Con., g	Colo	2,000,000	2,0,0,000	1		180,000	Feb.. '06	00½
Crocus, g	Colo.	1,000,000	500,000	5		247,300	May 2,'08	.03
Crown King	Ariz..	4,000,000	400,000	10		242,760	May.. '01	.02
Crison, z.	Wis.	63,000	60,000	1		3,000	Dec. 15,'09	.05
Cumberland-Ely, c	Nev.	6,5 0,000	1,,7,0 0	0	300 00	290,000	Sept.15,'10	.01
Dall, z. l	Wis.	60,000	6,000	1		45,000	Nov. 20,'09	.05
Dalton & Lark	Utah	2,500,000	2,500,000	1		350,000	July.. '01	10½
Daly Judge	Utah	300,000	20,000	15		325,000	Apr. 12,'07	37½
Daly, g. s. l	Utah	1,000,000	1,0,0	20		2,925,000	Mar.. '97	.25
Daly West, g. s. l.	Utah	3,600,000	180,000	20	10,800	6,,01,000	Daly 20,'10	.20
De Lamar, g. s	Idaho	400,000	80,000	5	4,0,0,0	2,5,5,520	Oct. 5,'10	.25
Deadwood Stand pf	Dak.	600,000	600,000	1		5,850	June.. '01	.10
Dearly Con., g	Utah	300,000	300,000,	1		5,850	June.. '01	.10
Diamondfield, g	Nev.	1,000,000	732,000	1		14,850	Sept.. '05	.02
Dillon, g	Colo.	1,2,0,000	1,2,0,000	1		156,250	Nov.. '03	.01
Dr. Jack Pot Con.	Colo.	2,000,000	2,000,000	1	15,,0	90,000	Feb. 20,'10	.03
Doe Run, l	Mo...	10,000,000	62,480	10	96,,22	2,,48,4,8	Sept.15,'10	1 50
Dot on Con., g	Colo.	3,000,000	2,,50,000	1	1,,,,0	2,666,,49	Oct. 24,'10	.01
El Paso, g	Colo..	2,,00,000	2,4,0,000	1	24,,,,0	1,,39,045	Mar. 31,'10	.05
Empire, z	Wis.	30,000	3,,1	6		3,,,,000	Sept.15,'08	4 00
Federal Sm., com	Idaho	10,000,000	60,0,3	100		2,,98,,,0	Jan 15,'09	1 50
Federal Sm., pf	Idaho	20,000,000	129,000	100	645,000	5,,91,200	Sept.15,'10	1 75
Findley, g	Colo.	1,250,000	1,250,000	1		500,000	Sept.. '06	.01
Florence, g	Mont	2,500,000	400,000	5		223,,,0	Mar.. '00	.05
Florence Vanes	Nev.	1,000,000	1,000,000	1		50,000	Jan.20,'08	.06
Florence-Goldfield, l.	Nev.	1,250,000	1,250,000	1	1,,,,0	2,,,,000	Feb. 1,'08	.01
Francis-Shamrock, g	Nev.	1,,0,000	910,000	1		516,000	Jan. 1,'08	.05
Free Coinage, g	Colo.	1,000,000	10,001	100		180,000	Dec. 25,'09	1 00
Freedom, g	Colo.	1,000,000	1,000	10	0,,80	0,,80	Dec. 25,'09	.10
Freedom, g	Wis...	1,000,000	1,000	1		2,000,000	Aug. 1,'08	10 00
Gemini, g. s. l		500,000	500,000	1		2,000,000	Aug. 1,'08	10 00
General Dev. Co		2,,00,000	20,,11	100	2,,1,20	2,,,,,,0	Sept.1,'10	5 00
Gianella		2,,00,000	2,,00	10		1,,,0	June 5,'09	1 00
Gold Coin of Colo.		1,000,000	1,0,0,0	1		1,,,,0	Feb. 1,'08	.01
Gold Dollar Con., g		1,000,000	1,000,000	1		1,,,,0	Oct. 10,'09	.02
Gold King Con., g		6,000,000	6,000,000	1		1,253,8,8	Dec.. '03	.01
Gold Reward		2,500,000	2,500,000	10		1,,,,,,0	Dec.. '06	.01
Gold Sovereign		2,000,000	1,,,,,,,,1	1		27,071	Nov.. '06	00½
Golden Argus, g	Cal	500,000	8,,,,0	100		7,,,,0	Dec.. '02	.25
Golden Cycle, g	Colo	1,000,000	1,,,,,,,,,1	1		5,,,,0	Dec.. '05	.01
Golden Eagle, g	Colo	1,000,000	1,000,000	1		10,,,1	Sept.. '01	.01
Golden Star, g	Ariz.	2,000,000	1,0,,,,0	1	2,,,,0	1,,,,,0	Mar 15,'10	.05
Gould & Curry, g	Nev.	1,,,,,,0	5,,,,,1	1	42,,,0	1,,,,,0	Jan 1,'10	.03
Grand Central, g	Nev.	1,,,,,,0	1,,,,,,,,0	1		97,11,,,0	Apr 1,'10	.01
Grand Prize, g pf	Nev.	50,000,000	5,,,,,,,,0	0	1,,,,,,0	11,,27,812	Oct 31,'10	.50
Grand Rapids, g	Colo.		5,,,,,,,,,0	1		2,,,,,,0	Jan.. '05	.25
Grand Prize, g pf	Utah		2,,,,,,,,,0	1	1,,,,,0	1,,,,,,0	Oct.. '05	.06
Granite, g	Colo.		1,,,,,,,,,0	1		2,,,,,,0	Nov.. '02	.01
Grass Valley Exp	Cal.		3,,,,,,,,,0	1		3,,,,,,0	Jan.. '03	.25
Grand Island Bell, g	Colo		2,,,,,,,,,0	1		2,,,,,,0	June.. '00	.02
Gwin, g	Cal		1,,,,,,,,,0	10		1,,,,,,0	Sept.. '01	.02
Hazel, g	Utah		5,,,,,,,,,0	1	6,,,,,0	6,,,,,,0	July 5,'10	.01
Hecla, s. l	Idaho		5,,,,,,,,,0	1	1,,,,,0	2,,,,,,0	Sept.'10	.02
Hercules	Idaho		1,,,,,,,,,0	1		2,,,,,,0	Sept.'10	.02
Gene Horseshoe, g	Mont		1,,,,,,,,,0	1		3,,,,,,0	June.. '01	.01
Hidden Treasure, g	Cal		3,,,,,,,,,0	10		4,,,,,,0	Sept.. '00	.10
Hoss Terrell, g	N. D		500,000	1		1,,,,,,0	Jan.. '00	.10

NAME OF COMPANY.		Authorized Capital Stock.	Number Shares Issued	Par Val	Dividends on Issued Capitalization. Paid in 1910.	Total to Date.	Latest, Date.	Amt.
Homestake, g	S. D.	$21,840,000	218,000	$100	$87,,,,0	$19,,,,,,0	Oct 25,'10	$3 50
Horn Silver	Utah	10,000,000	400,000	25		5,,,,,,0	Sept.30,'07	.05
Idaho	Idaho	100,000	1,000	10		10,000	May 15,'02	1.00
Imperial, c	Ariz..	5,000,000	500,000	10		300,000	June25,'07	.20
Independence Con., g	Colo..	2,500,000	2,500,000	1		281,,,5	Apr.. '01	.04
Indiana Con., g	Colo.	1,500,000	1,,,,,,0	5		,,,,,,1	Aug.. '01	00½
Intern'l Nickel, com	U. S.	12,000,000	88,226	100	2,,,2,,,7	2,,,,,,2	Sept 1,'10	1.50
Internat'l Nickel pf	U. S.	12,000,000	89,,,6	100	401,,,7	4,,,,,,1	Aug 1,'10	1.50
Intern Sm. & Ref	U. S.	50,000,000	100,000	100	600,000	900,000	Sept. 1,'10	2 00
Iowa, g. s. l	Colo.	1,666,667	1,666,,6,1	1	16,,66	183,,00	June 1,'10	.01
Iowa Tiger, g. s. l	Colo..	20,000	12,655	1		12,655	Sept.15,'09	.20
Iron Blossom	Utah	100,000	1,000,000	0 10	20,,00	680,000	Sept.26,'10	.06
Iron Cloud, g	Colo.	1,000,000	1,000,0 0	1		50,000	Nov.. '06	.05
Iron Silver	Colo	10,000,000	500,000	20	100,000	4,,50,000	Apr. 1,'10	.10
Isabella, g	Colo.	2,,50,000	2,,50 0	1		742,500	Mar.. '01	.01
Jamieson, g	Cal.	3,000,000	300,000	10		354,000	July.. '09	.02
Jerry Johnson, g	Colo.	2,500,000	2,500,000	1		100,000	Dec. 15,'09	.01
Katinka, g	Colo..	1,000,000	1,000,000	1		10,000	Oct.. '03	.01
Kend. & Creede Sm.	Colo..	1,000,000	1,000,00	1		10,000	Dec.. '01	.01
Kendall, g	Mont	2,500,000	500,000	5	20,000	1,,05,000	Oct 22,'10	.02
Kennedy, g	Cal.	10,000,000	100,0 0	100		1,,01,000	June.. '00	.15
King of Arizona, g	Ariz.	250,000	50,0 0	1	4,0,,0	296,000	Aug. 2,'09	.12
Kirf Piquette, z	Wis.	20,000	20,000	1		2,,,,0	Nov 1,'09	.25
La Fortuna, g	Ariz..	250,000	250,000	1		1,,40,,00	Oct.. '02	.03
Lake City, g	Colo..	50,000	50, 00	1		67,875	May.. '00	.02
Last Dollar, g	Colo..	1,500,000	1,,,0,,000	1		130,000	Feb 23,'02	.02
Lexington, g	Colo.	1,250,000	1,250,000	1		12,500	Dec.. '05	.01
Liberty Bell, g	Colo	700,000	1,,0,,5,5	5		247,,26	Sept. 1,'09	.15
Lightner, g	Cal	125,000	10,,,55	1		341,179	June.. '06	.05
Little Bell, s. l	Utah	1,,50,000	50,,,6	1	4,,,,0	60,000	Sept.22,'10	.05
Little Florence	Nev	1,000,000	1,0,0,000	1		430,000	Jan .08	.03
Lower Mammoth	Utah	250,000	190,000	1		63,078	Dec. 29,'09	.07½
Lucky Budge, z	Mo.	40,000	1,,,,,,,,,

Dividends of United States Mines and Works—Continued.

NAME OF COMPANY	Auth'd Capital Stock.	Number Shares Issued	Par Value	Capital Paid in, 1910.	Total to date.	Latest. Date.	Amt.
Silver Mines Exp.	N. Y.	$1,000,000	1,000,000	10			
Silver Shield, g.	Utah	100,000	100,000	1			
Sioux Cons.	Idaho	1,000,000	1,000,000	1			
Skaloo, g.	Cal.	600,000	1,000,000				
Smuggler, s. l. g.	Colo.	1,000,000	1,000,000	1			
Snowstorm, c.	Utah	1,000,000	1,000,000	1			
South Swansea	Utah	1,000,000	1,000,000	1			
Spearfish, g. pf.	S. Dak.	1,500,000	1,500,000	1			
Specie Payment, g.		1,000,000	1,000,000	1			
Southern Boy, g.	Colo.	1,000,000	1,000,000	1			
South Wash. g. & s.	Colo.	1,000,000	1,000,000	1			
Standard Con. g. & s.	Cal.	1,000,000	1,000,000	1			
Standard, c.	Ariz.	1,000,000	1,000,000	1			
Stratton's Chas. Con.	Colo.	2,000,000	2,000,000	1			
Stratton's Ind.	Colo.	1,000,000	1,000,000	1			
Stratton's Ind. (new) g	Colo.	1,000,000	1,000,000	1			
Stratton's Independence	Colo.	1,000,000	1,000,000	1			
Strong, g.	Colo.	1,000,000	1,000,000	1			
So Swansea, g., s. l.	Utah	1,000,000	1,000,000	1			
Success	Idaho	1,000,000	1,000,000	1			
Swansea, s. l.	Utah	1,000,000	1,000,000	1			
Syndicate, g.	Cal.	100,000	100,000	1			
Tamarack, c.	Mich.	1,000,000	1,000,000	1			
Tennessee, c.	Tenn.	5,000,000	200,000	1			
Tetro, g. l.	Utah	300,000	300,000	1			
Tomboy, g. s.	Colo.	1,000,000	1,000,000	1			
Tonopah-Alpine, g.	Nev.	700,000	700,000	1			
Ton.-Belmont, g.	Nev.	2,000,000	1,500,000	1			
Ton.Extension, g. s.	Nev.	1,000,000	998,000	1			
Tonopah, g. s.	Nev.	1,000,000	1,000,000	1			
Tonopah Midway, g.	Nev.	1,000,000	1,000,000	1			

Corrected to Nov. 1, 19..

Capitalization and Dividends of Foreign Mines and Works.

NAME OF COMPANY	Auth'd Capital Stock.	Number Shares Issued	Par Value	Capital Paid in, 1910.	Total to date.	Latest. Date.	Amt.
Ajuchitlan	Mex.	$250,000	50,000	$ 5	$ 250,000	Oct. 1, '10	$0.05
Amistad y Concordia g. s.	Mex.	480,000	4,000	10	42,000	May 15, '10	5.50
Amparo, s. g.	Mex.	3,000,000	2,550,000	1	600,000	Mar. 10, '08	.25
Bartolome de Medina Mill	Mex.	50,000	2,000	25	16,000	Aug. 1, '07	3.00
Batopilas, s.	Mex.	9,000,000	440,000	20	5,850,000	Dec. 31, '07	.87
Boleo, g.	Mex.	2,400,000	120,000	20	2,400,000	Mar. '09	6.00
British Columbia, c.	B. C.	3,000,000	500,000	5	274,240	Sept. 4, '07	.10
British Guiana, g., pf.	Br. G.	1,000,000	200,000	5			
Buffalo, Ont.	Ont.	1,000,000	1,000,000	1		Oct. 1, '08	.05
Butters Salvador g.	Salv.	$250,000	150,000	10	987,000		.25
Cariboo McKinney g.	B. C.	1,250,000	1,250,000	1			.004
City of Cobalt	Ont.	500,000	500,000	1		May 1	.01
Cobalt Central s.	Ont.	5,000,000	4,761,500	1			.01
Cobalt Silver Queen	Ont.	1,500,000	1,500,000	1	315,000		.03
Coniagas, e.	Ont.	1,500,000	800,000	1	1,280,000		.15
Con. Mg. & Sm., g. s. c.		5,000,000		10	781,885		1.25
Costa Rica Esperanza	R.	2,500,000	84,960		830,800	Jan. 15, '08	.60
Crown Reserve, s.	Ont.	5,000,000	1,700,000	1			
Dolores, s.	Mex.	2,000,000	400,000	5			.32
Dos Estrellas, (El Oro)	Mex.	1,000,000	300,000	5	600,000	July 1,	
El Oro, g. s.	Mex.	5,750,000	1,147,500	5			
El Rayo, g. s.	Mex.	1,000,000	200,000	5	46,802	Apr. 1,	
Esperanza, s. g.	Mex.	2,250,000	450,000	5		Oct. 14,	
Foster Cobalt.	Ont.	1,000,000	1,000,000	1		Jan. 2,	
Fraternal, s.	Mex.	5,000,000	1,000,000	5		Nov. 15,	
Granby Con., c. g. s.	B. C.	15,000,000	175,000	100		Dec. 31,	2.00
Greene Gold-Silver, pf.	Mex.	3,000,000	300,000	10	194,871	Mar. 28,	.40
Greene Con., c.	Mex.	10,000,000	854,000	10	6,137,800	Mar. 28,	.40
Greene Con., g.	Mex.	5,000,000	450,000	10	300,000	July	.50
Guanajuato Con.	Mex.	5,000,000	500,000		600,000	Oct.	
Guanajuato Dev., pf.	Mex.	1,000,000	10,000	1	60,000	July 1,	
Guggenheim Explorat'n	Mex.	22,000,000	170,000	100	1,700,000	10,151,995	2.50
Hailebury, s.	Ont.		500,000			Apr.	.50
Hedley.	B. C.	1,000,000	120,000	1	144,000	Oct. 1,	
Hinds Con., g. s. l.	Mex.	5,000,000	5,000,000	1			.02
Jimulco, c.	Mex.	1,000,000	100,000	10	10,000	Feb. 19,	1.00
Kerr Lake, s.	Ont.	3,000,000	600,000	5		Sept. 15,	
*La Rose Con., s.	Ont.	7,500,000	1,144,000	5			
Las Canrillas.	Mex.	10,400	1,040	10	10,400		10.00
Le Roi, g.	B. C.	5,000,000	1,000,000	5			.05
Le Roi No. 2, g.	B. C.	3,000,000	120,000				.50
Lucky Tiger.	Mex.	5,000,000		1			.05

Corrected to Nov. 1, 19..

Assessments Levied

Company.	Delinquent.	Sale.	Amt.
Alta Germania, Utah	Dec. 6	Dec. 29	.001
Amador, Idaho	Dec. 15	Dec. 31	.003
American Flag, Utah	Nov. 1	Nov. 17	.002
Big Casino, Cal.	Nov. 28	Dec. 19	.01
Black Pine, Utah	Nov. 25	Dec. 31	.10
Bonanza Mountain, Idaho	Nov. 18	Dec. 10	.001
California, Utah	Nov. 16	Dec. 1	.01
Cedar Creek, Idaho.	Nov. 14	Dec. 13	.001
Columbus Con., Utah	Nov. 26	Dec. 19	.01
Copper King, Utah	Nov. 8	Nov. 28	.01
Copper Queen, Idaho	Nov. 1	Nov. 18	.01
Deer Trail, Utah	Dec.	Dec. 6	.01
Dennemora, Idaho	Jan.	Jan. 7	.001
Ely Central, Nev.		Dec.	.01
Emerald, Utah	Nov. 1	Nov. 20	.01
Emerald, Utah	Dec. 1	Dec. 20	.01
Florence, Idaho	Feb. 28	Mar. 20	.001
Franklin, Idaho	Dec. 1	Jan.	.01
Gold Mtn Champion, Utah	Dec. 1	Dec.	.01
Gray, Idaho	Nov.	Dec.	.001
Great Copper King, Utah	Nov. 5	Dec.	.01
Horseshoe, Idaho.	Dec. 10	Dec. 31	.001
Hypotheck, Idaho	Nov. 16	Dec. 5	.001
Ibex, Idaho	Dec. 15	Dec. 31	.01
Idaho Belcher, Idaho	Nov. 15	Dec. 15	.001
Idaho, Idaho	Nov. 22	Dec. 10	.001
Imperial, Idaho	Nov. 10	Dec.	.001
Iron Mask, Idaho	Nov. 19	Dec. 19	.001
Jesse James, Idaho.	Nov. 18	Dec.	.001
Little Mint, Idaho	Oct. 31	Nov.	.001
Little North Fork, Idaho.	Nov. 15	Dec.	.001
Lower Mammoth, Utah	Nov. 11	Dec.	.005

Recent Mining Incorporations.

[illegible] Gold Mining Co. Capital stock, $1,000,000. Offices, Windsor, Ont., Can. [illegible] directors, G. A. Winter-[illegible]

[illegible] Mining Co. Capital stock, $1,500,000. Offices, [illegible] Ont. Directors, E. E. Gough, D. Kokenburger, E. Roy, G. H. Kent, G. Gorgius.

[illegible] Mining Co. Capital stock, $500,000. Offices, Toronto. Provisional directors, [illegible] W. Gingley, H. Gingley.

Pearl Lake Gold Mines. Capital stock, $2,500,000. Offices, Cobalt, Ont., Can. Property located at Pearl Lake, Porcupine district, Ont. Burr E. Cartwright, organizer.

McKinley Gold Mining Co. Capital stock, $500,000. Offices, Cordova, Alaska. Incorporators, Frank Townsend, H. B. Rice, H. R. Simpson, all of Cordova.

Latest Quotations on American and Foreign Mining Stocks.

Copper, Gold, Silver, Lead, Zinc, Quicksilver.

(*) Dividend Payers (see monthly dividend tables)

New York.

Nov. 21

Name of Company.	High.	Low
Alaska Mines	$3.05	$3.01
*Amalgamated, Mont.	70.25	69.37½
*Am. Sm. & Ref. com.	81.50	80.25
*Am. Sm. & Ref., pf.	106.00	106.00
*Anaconda, c, Mont.	42.00	41.75
*Batopilas, s, Mex.	2.62½	2.25
*British Columbia, c.	6.62½	6.50
*Butte Coalition, c., Mont.	20.50	19.50
*Caledonia, Idaho	.68¾	.65½
Chino, c., N. M.	24.87½	24.00
*Cobalt Central, Ont.	.08½	.08
Colonial Silver Cobalt, Con. Ariz. Sm., new	.50	.37½
*Davis-Daly, Mont., rets.	1.93¾	1.93¾
*Dolores, Mex.	1.75	1.43¾
El Rayo, Mex.	5.62½	5.00
Ely Central	3.62½	3.50
*Federal M. & S. com.	.06½	.05
*Federal M. & S. pf.	58.50	58.00
*Florence Goldfield	1.81¼	1.81¼
*Foster Cobalt	.14	.06
Furnace Creek, Cal.		
Giroux Con., Nev	7.62½	7.56¾
*Goldfield Con., Nev.	8.00	8.00
Goldfield Daisy, Nev.	.08	.06
Gold Hill, N. C.	.68¾	.56¼
Greene-Cananea, Mex	8.00	8.00
Greenwater Cop. M. & Sm.		
*Guggenheim Expl.		
*Homestake, S. D.	9.87½	9.50
Inspiration		
*International Sm. & R.	.12	.08
King Edward, s, Ont.	4.75	4.75
*La Rose, Con., Ont.	2.62½	2.43¾
Little Miami, c, Ariz.	10.50	10.50
Mason Valley, new	1.25	1.15
*McKinley-Dar-Sav., Ont.		
Mexican Expl. & Mg.	20.12½	20.12½
Miami, c., Ariz.	.60	.50
*Mines Co. of Am., new		
*Mitchell, c., Mex.		
Mont. Tonopah		
Montgom'y-Shoshone, Nev	.20	.10
*National Lead, com.		
*National Lead, pf.	106.25	106.25
*Nevada Con., c., Nev.	21.00	20.75
Nevada Sm., Nev.	.13¾	.08¾
Nevada-Utah	1.12½	1.06¼
New Baltic, c., Mich.		
*Nipissing, Ont.	11.00	10.75
*Ohio, c., Utah	1.75	1.56¾
*Ontario, s., Utah		
*Ophir, Nev.		
Quicksilver, com.		
*Quicksilver, pf.	.03	.03
Rawhide Coal, Nev.	2.50	2.43¾
Ray Central, Ariz.	21.25	20.62½
Ray Con., Ariz.	615.00	615.00
*Standard Oil,	.75	.62½
Stewart, Idaho	37.37½	37.00
*Tenn. Copper	8.50	8.37½
*Tonopah, Nev.		
Tramps Con., Nev.	.56¼	.53¾
Tri-Bullion Sm. & Dev.	.87½	.87½
Union, c., N. C.	5.12½	5.00
*United Cop., com., Mont.	20.00	10.00
United Cop., pf., Mont.		
United Rico, g., Colo.		
*U. S. Red & Ref. com.		
*U. S. Red & Ref. pf.	81.12½	79.62½
*U. S. Steel, com.	118.75	118.00
*U. S. Steel, pf.	50.37½	49.75
*Utah Copper	3.75	3.56¾
*Yukon, g.		

Vancouver, B. C.

Nov. 17

Name of Company.	Bid	Asked
Bitter Creek		$0.05
*B. C. Copper	6.75	6.90
*Canadian Con.	.70	.71
Glacier Creek		
*Granby	$3.00	$0.00
Lasqueti Island	.02½	.03
Nugget, G. M.	.95c	.99
Portland Canal	.20c	.22
Portland Wonder		
*Rambler-Cariboo	.27	.28
Red Cliff	.93	.99
Stewart, M. & D.		2.35
Vanc. Port. Canal	.99	1.00

Spokane.

Nov. 18

Name of Company.	High.	Low
Ajax	$0.04	$0.04
Am. Commander, Idaho	.03	.01½
Bullion, Idaho	.01	.01½
*Caledonia	.59	.60
Copper King	.08	.06½
Gertie, Idaho	.01½	.01
Happy Day, Idaho	.01	.00½
*Hecla, Idaho	2.40	2.00
Holden, Idaho	.03	.02
Hummingbird, Idaho	.10	.08
Hypotheek	.04½	.03½
Idora	.04½	.04½
Lucky Calumet, Idaho	.04	.03½
*Mineral Farm, Idaho	.01	.00½
Missoula, c., Idaho	.07	.06½
Moonlight, Idaho	.05½	.04
Nabob, Idaho	.07	.06
North Franklin	.04	.02
Oom Paul, Idaho	.05	.02½
Reindeer, Idaho	.05	.04
Rex (16 to 1,) Idaho	.09	.06
Snowshoe, Idaho	.03¾	.02½
*Snowstorm, Idaho	.10	.09
*Sonora, Idaho		
*Stewart	.78	.75
*Tamarack & Chesapeake	.76	.75

Boston.

Nov. 21

Name of Company.	High.	Low.
Adventure, c, Mich	$8.75	$8.50
Algomah, c., Mich.	10.00	10.00
Allouez, c., Mich.	44.12½	43.87½
*Am. Z. & L., Mo.	30.00	29.75
Arcadian, c., Mich.		
Arizona Com'l	17.50	17.50
*Atlantic, c., Mich.	7.37½	7.37½
Bohemia		
Boston & Corbin, Mont.	16.75	16.75
Boston Ely, Nev		
*Butte Coalition	20.50	20.00
*Butte & Bal., Mont.	7.25	7.00
*Cal. & Ariz., c., Ariz.	55.50	55.25
*Cal. & Hecla, Mich.	600.00	590.00
Centennial, c, Mich.	18.00	18.00
Con. Mercur, Utah		
*Copper Range Con., Mich.		
Daly West, Utah	3.87½	3.87½
East Butte	13.62½	13.00
Elm River, Mich.		
First Nat'l., c		
Franklin, c, Mich.	11.60	11.25
*Granby Con., B. C.	45.50	45.00
Hancock Con.	26.50	25.87½
Helvetia, c., Ariz.		
Indiana	15.50	14.50
Isle Royale, c., Mich	21.00	20.25
Keweenaw, c., Mich.	3.37½	3.37½
Lake Copper	38.00	36.75
LaSalle	8.00	7.75
Mass Con., Mich.		
Mayflower, c., Mich.		
Mesnard, c., Mex.		
Miami, c., Ariz.	20.37½	20.00
Michigan, c., Mich.	4.50	4.50
Mohawk, c., Mich.	49.00	48.00
*Nevada Con., Nev.	21.00	20.75
New Arcadian, c., Mich.	4.75	4.50
*North Butte, c. g. s., Mont.	36.50	35.75
North Lake, c., Mich.	8.00	8.01
Ojibway, c., Mich.		
Old Colony, Mich.		
*Old Dominion, Ariz.		
Osceola Con., Mich.		
*Parrot, Mont.		
*Quincy, Mich.	78.00	78.00
Raven, Mont.		
Santa Fe, N. M.		
*Shannon, c., Ariz.	13.50	13.12½
*Shattuck, Ariz.	24.00	24.00
Superior & Boston, Ariz.	7.75	7.75
Superior, c., Mich.	48.75	48.00
Superior & Pittsburg, Ariz.	14.62½	14.37½
Tamarack, c., Mich.	61.00	61.00
Trinity, c., Cal.	5.50	5.50
*U. S. Sm., Ref. & Mg., com.	37.50	36.75
*U. S. Sm., Ref. & Mg., pf.	48.00	47.00
Utah Apex	3.12½	3.00
*Utah Con., Utah	24.75	24.75
Victoria, c., Mich.		
Winona, Mich.	9.75	9.75
*Wolverine, c., Mich.		
Wyandotte, c., Mich.		

Salt Lake City, Utah.‡

Nov. 18

Name of Company.	High.	Low.
Ajax		
Alta-Hecla		
*Beck Tunnel Con.	$0.13	$0.11½
Bingham Amalgamated	.06⅝	.05½
Black Jack	.16½	.15½
Bonnie Brier		
Bullion Beck		
*Carisa	.15	.10
Cedar Talisman		
*Century	.16	.06
*Colorado	.43	.42
*Columbus Con.	.31	.29
Crown Point		
*Daly Judge	4.50	4.35
East Crown Point	.00½	.00½
East Tintic Con.	.00⅝	.00⅝
Ely Calumet, Nev.	.09	.09
Emerald		
Gold Circle Crown, Nev.		
*Grand Central	1.00	.83
Ibex		
Ingot, g. s.	.01	.01
Indian Queen	.01	.00⅝
*Iron Blossom	.83	.82
Iron Blossom		
Iron King	.11	.04
Key-tone		
King William		
Little Bell	1.10	1.10
Little Chief		
Lower Mammoth	.14	.13½
May Day	.11½	.10½
Mountain Lake	.05	.04½
Nevada Hills, Nev.	2.37½	2.25
New York	.05	.04⅜
*Ohio Copper	1.75	1.75⅜
Opex	.18½	.18
Prince Con.	.85	.80
Richmond Anaconda		
*Sacramento	.01½	.01½
Seven Troughs	.05	.04
Silver King Coalition	2.00	1.80
Silver Shield	.10	.08
Sioux Con.	.30	.28
South Columbus Con., s.	.14⅜	.14
*Swansea Con., g. s.	.03½	.03½
Tintic Central	.09⅜	.09⅜
Tintic Comb	.01½	.01
*Uncle Sam Con.	.62	.61
*Utah Con	.03	.02
Victor Con	.03	.03
*Victoria	.60	.50
Wabash		
Western Nev	.08	.08
Yankee Con.	.10	.08
Yerington Copper, Nev.	.02¾	.02½

‡All Utah Stocks, unless stated otherwise.

London.

Nov. 10

Name of Company.	Closing High.
*Alaska Mexican	£3 13s 9d
*Alaska Treadwell	8 11 3
*Alaska United	3 2 6
*Apex, Transvaal	3 18 9
*Arizona	17 18 9
Barranca, Mex.	1 0 0
Botallack tin	
*Briseis tin, Tasmania	0 7 0
Brit. Sc. Af., Char. Rhod	1 12 2
*Broken Hill Prop., N. S. W.	1 18 0
*Camp Bird, Colo.	1 10 6
*Cape Copper, ord.	7 0 0
*Cape Copper, pf.	4 5 0
Cinderella Deep, Transvaal	1 18 9
*City & Suburban, Trans.	2 6 3
Colorado Townsite, s.	0 8 9
*Con. Bultfontein, diamond.	1 7 6
*Copiapo, c, Chile	0 6 3
Coralba Copper	0 5 9
*Crown Deep, Trans.	8 5 0
*Crown Reef, Trans.	8 1 3
*De Beers, diamond, def.	17 13 9
*De Beers, pf.	17 12 6
*Dolores, Mex.	
East Rand Prop., Trans.	5 2 6
*El Oro, Mex.	1 7 0
*Esperanza, Mex.	2 6 3
Famatina, c., Argentine	1 5 0
*Ferreira, Trans.	10 0 0
Frontino & Bolivia	0 6 3
*Geldenhuis Deep, Trans.	3 15 0
*Geldul, Trans.	1 12 6
Glass Mines, Rhodesia	4 17 6
Gt. Fingal Cons., g.	0 14 6
*Gopeng, tin, Straits	3 10 0
*Heriot, Transvaal	0 17 6
*Jubilee, Transvaal	0 12 6
*Kaiguri, W. A.	6 15 0
*Kinta, tin, Straits	2 1 3
*Kleinfontein, Transvaal	0 6 3
*Langlaagte Est., Trans.	2 17 6
*Le Roi, B. C.	1 13 9
*Le Roi No. 2, B. C.	1 15 0
*Lisbon, Spain	0 6 0
*Mason & Barry, c., Port.	8 0 0
*Mexico Mines of El Oro	7 5 0
*Meyer & Charlton, Trans.	4 7 6
*Modderfontein Deep, Trans.	1 13 9
Mount. c., Cal. (6% deb.)	1 17 6
*Mt. Boppy, g., N. S. W.	9 8 9
*Mt. Morgan, g., Queensland	3 16 3
Mysore, g., India	5 11 3
*N. Gopeng, tin, Straits	2 16 0
*New Jaggersf'n, diamond.	8 15 0
*New Jaggersfontein, pf.	
*New Primrose, Trans.	1 11 3
*Nigel, Transvaal	2 15 9
*Noordrdroog, g., Ind.	1 13 9
*Ooregum, g., India	0 16 3
*Ooregum, preferred	1 3 9
*Oroya Brdg'e, Cal.	0 7 6
Palmarejo & Mexican	0 2 9
*Premier, def., Trans., diamond.	7 18 9
*Premier, pf.	8 15 0
*Rising Sharu, tin, Straits	0 17 6
*Rio Tinto, Spain, c.	70 15 0
*Rio Tinto, pf.	5 12 6
Rob'n Deep, Trans.	3 0 0
*Robinson Gold, Trans.	9 12 6
Rose Deep, Trans.	4 1 3
*Sim'r & Jack Prop., Trans.	1 10 0
*St. John del Rey, Brazil	0 15 0
*Stratton's Indep.	0 3 0
Talisman Con., N. Z.	2 16 3
Tanganyika Concessions	6 12 6
*Tingha, tin, Straits	
Tolima, g., Colombia	0 6 3
*Tomboy, Colo.	0 18 9
Utah Apex	0 16 9
*Utah Con., c.	
*Van Ryn, Trans., Deep	0 16 0
*Village Main Reef, Tr.	2 2 6
Wahl, g., N. Z.	5 15 0
Witwatersrand Deep	4 12 6
Zinc Corp., des., N. S. W.	0 13 3
Zinc Corp., pref.	2 8 9

Colorado Springs, Col.

Nov. 19

Name of Company.	High.	Low.
*Acacia	$0.05¾	$0.05⅜
Blue Belle	.01½	.007
C. C. & M.	.01	.01
*Cripple Creek Con	.02⅝	.02⅜
O. K. & N.	.15	.15
Dante		
*Doctor Jack Pot	.09⅜	.09⅛
Elkton Con.	.78	.76½
El Paso	.90	.89
Fanny Rawlins	.07	.05
Findly Con.	.08	.06
Golden Cycle	2.25	2.00
Gold Dollar Con.	.13⅝	.13¼
Gold Sovereign	.04	.03½
Gould	.02¼	.01⅞
Index	.02⅜	.02¼
*Jack Pot	.18⅝	.17½
Jack Pot	.10¾	.09½
Jennie Sample	.11⅝	.11
*Jerry Johnson	.06⅜	.06⅛
*Last Dollar		
*Lexington	.02	.01
Little Puck	.009	.0065
Mary Cashen		
*Mary McKinney	.51	.49⅜
Mary Nevin	.06½	.06
Moon Anchor	.03⅞	.03⅜
Mountain Beauty	.02⅜	.02½
*Old Gold	.04⅜	.04
*Pharmacist	.03	.02⅜
*Portland	1.20	1.15
Rose Maud	.02⅜	.01⅞
*United	.05¼	.04⅜
*Vindicator Con	.92	.91
*Work	.04	.03

Mexico.‡

Nov. 17

Name of Company.	High.	Low.
Alacran, Mex.	$130	$390
*Amistad, Hidalgo		
Angustias, Dolo, Gto.	550	550
Blanca y Anexas, Hdgo.	1000	970
Buen Despacho, Mex.		
Carbonecillo, Mex.	187	184
Carmen Mines, Mex.		
Cinco Senores, Gto.		
Cuchara, Mex.		
*Dos Estrellas, Mich.		
F. de Guanacevi, non-assess		
F. de Guanacevi, (pfd) Dgo.		
Frida M. & M., Oax.		
Glorie, Chih.		
Guad. de los Reyes, Mex.		
Mascota, Oax.		
Mina Grande (lib.), Jal.		
Natividad, Oaxaca		
Nuevas Golondrinas, Mex.		
Oro Nolan, Mex.	1070	1005
Oro Nolan (new), Mex.	860	860
*Penoles, Dgo.	4960	4860
Paz, S. L. P.	485	460
Protectora, Zac.		
Refugio, Hdgo.		
Roma, ord., Gto.	50	48
Roma, pfd., Gto.	50	46
Rubi, S. L. P.		
San Antonio, Guer.		
*San Rafael (tromp.) Hdgo.	1000	995
San Rafael (av.) Hdgo.	540	526
S. Gert y P.		
Seguranza, Mex.	16	13
*Soledad, Hdgo.	550	530
*Sorpresa, Hdgo.	875	872
Triangulo, Gto.	60	50
Veta Negra, assess, Mex.		
Veta Negra, non-assess.		
Victoria, Mex.	60	30
Zaragoza, assess, Zac.	160	140
Zaragoza, non-assess, Zac.		
Zacualpan, assess.		
Zacualpan, non-assess.		

‡Mexican silver currency—$1—49.8 cents.

San Francisco, Cal.‡

Nov. 17

Name of Company.	High.	Low.
Alpha	$0.04	$0.03
Alta	.10	.10
Andes	.07	.06
Belcher	.60	.55
Best & Belcher	.32	.28
Bullion	.09	.08
*Caledonia	.20	.17
Challenge Con.	.20	.16
Chollar	.06	.05
Confidence	.60	.50
Con. Imperial	.03	.02
Con. Virginia	.98	.96
Crown Point	.50	.45
Exchequer	.12	.11
Gould & Curry	.10	.08
Hale & Norcross	.20	.18
Julia	.10	.07
Justice	.10	.05
Kentuck	.10	.10
Lady Washington	.08	.06
Mexican	1.02	1.00
North Gould & Curry	.14	.14
New York Con.	.03	.03
Occidental	.42	.42
Ophir	1.20	1.17
Overman	.35	.30
Potosi	.40	.40
Richmond Eureka		
St. Louis		
Savage	.11	.09
Scorpion	.04	.03
Seg. Belcher & Mides	.11	.09
Sierra Nevada	.18	.16
Silver Hill	.03	.02
Union Con.	.22	.21
Utah	.05	.04
Yellow Jacket	.42	.40

‡Comstock Mines.

Toronto.

Nov. 18

Name of Company.	High.	Low.
Amalgamated	$0.03	$0.01
Beaver Con.	.29¼	.28½
*Buffalo	2.03	2.00
Chambers-Ferland	.17¾	.17½
*City of Cobalt	.35½	.30
*Cobalt Central	.08¾	.07½
Cobalt Lake	.14½	.14¼
*Coniagas	4.60	4.30
*Crown Reserve	2.82	2.80
*Foster-Cobalt	.11	.07
Gifford	.06	.04½
Great Northern	.08¾	.07½
Green-Meehan	.03½	.03
*Hudson Bay	163.00	96.00
*Kerr Lake	7.50	7.45
*La Rose	4.83	4.80
Little Nipissing	.33¾	.32½
*McKinley-Darragh	1.22	1.20¾
Nancy Helen	.05	.03½
*Nipissing	10.77	10.75
Nova Scotia	.25	.23
Ophir	.21	.18
Otisse	.02	.01½
Peterson Lake	.30½	.29¼
*Right of Way	.30¾	.30
Rochester	.09¾	.09¾
Silver Bar	.06	.02
Silver Leaf	.06¼	.05½
*Silver Queen	.08	.06
*Temiskaming	.86½	.86½
*Trethewey	1.24	1.23½
Watts	.03	.00¾

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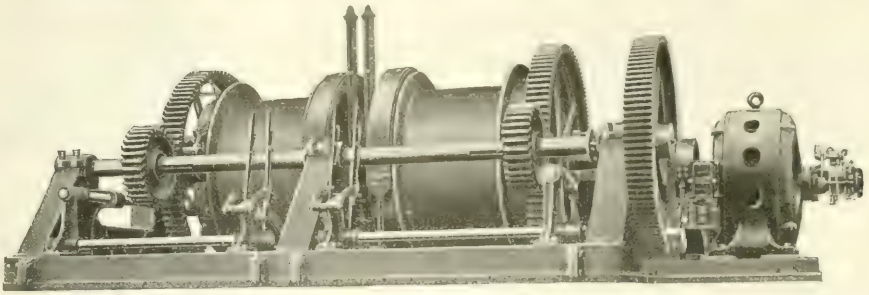

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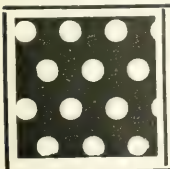

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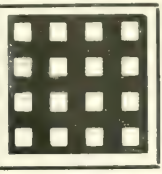

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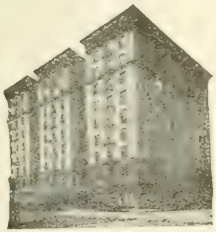

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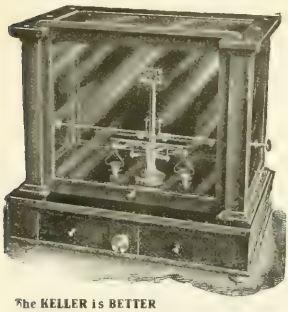

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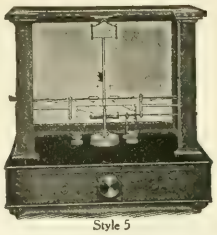

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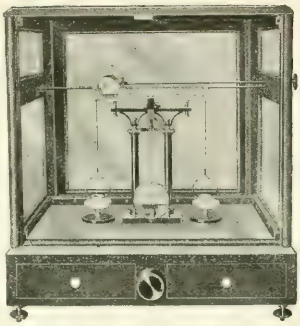

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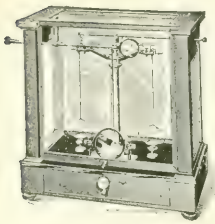

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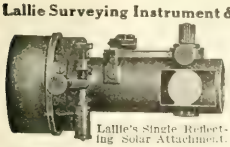

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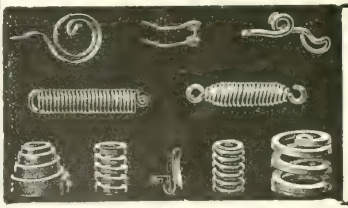

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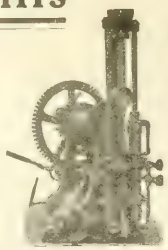

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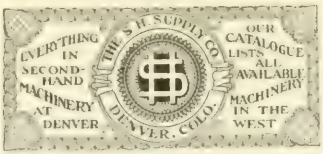
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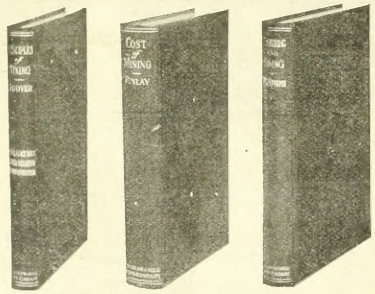

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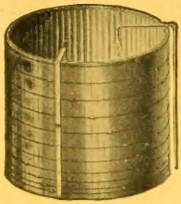

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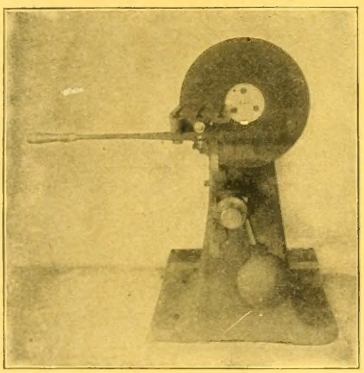

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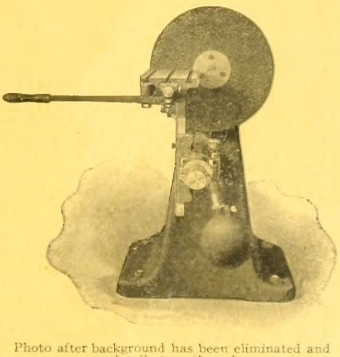

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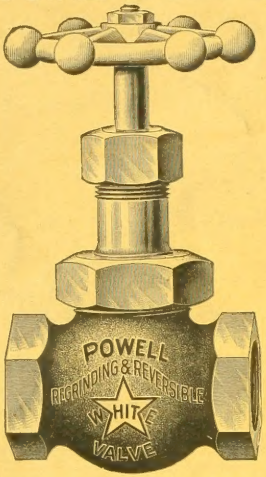

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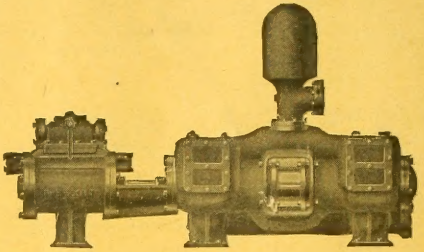

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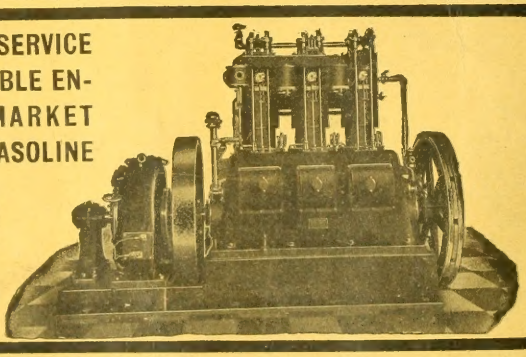

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